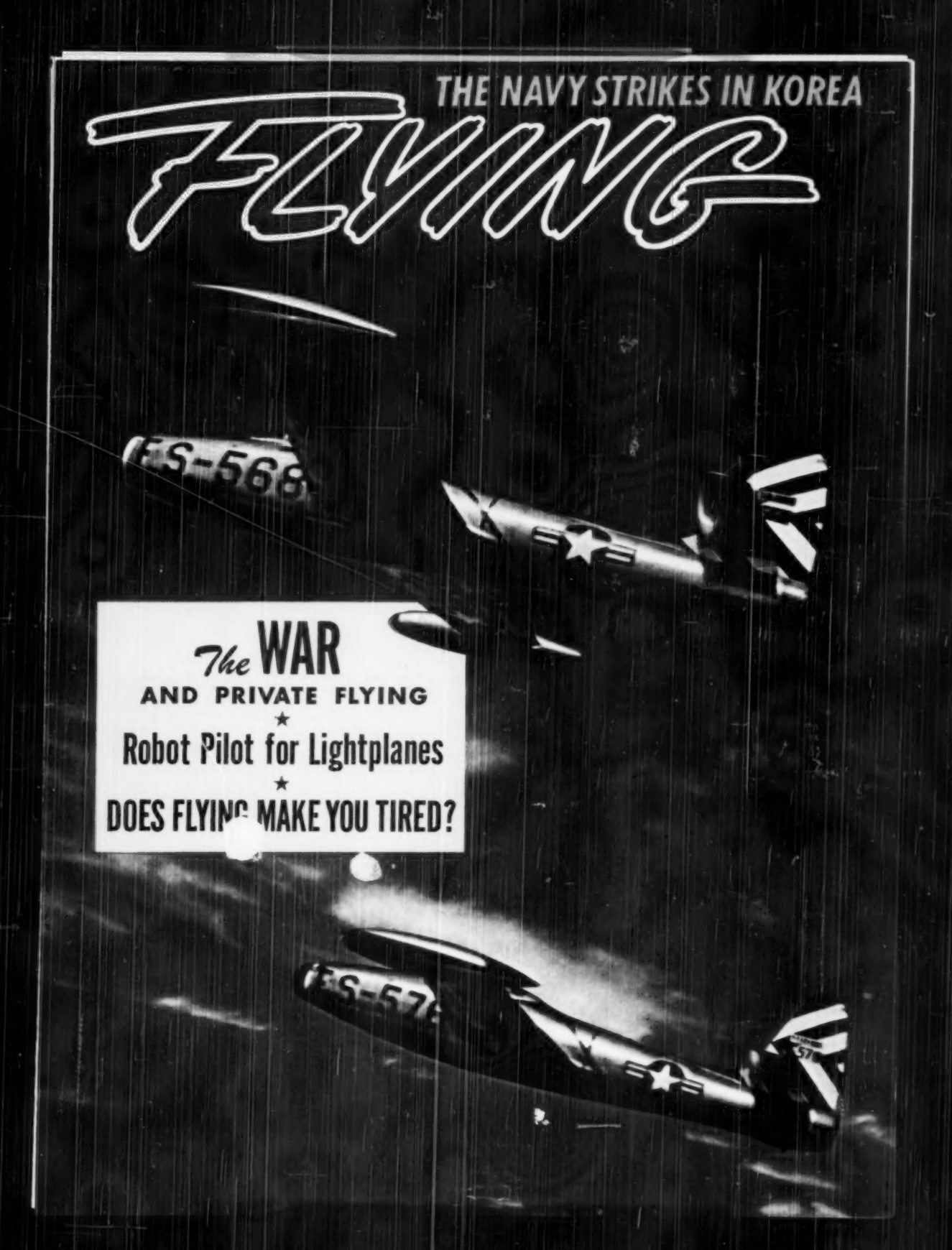
THE NAVY STRIKES IN KOREA

FLYING



The WAR AND PRIVATE FLYING

★

Robot Pilot for Lightplanes

★

DOES FLYING MAKE YOU TIRED?

Grumman

THE PANTHER
U. S. Navy's Jet Fighter

Just minutes ago this GRUMMAN PANTHER took off from the deck of a carrier miles over the horizon. Now, with others of its squadron, it is ready to perform its mission. (Note rockets under wing.) Impressive speed and formidable fire-power, plus traditional Grumman ruggedness, make the turbo-jet PANTHER a highly respected member of the Navy's air arm.

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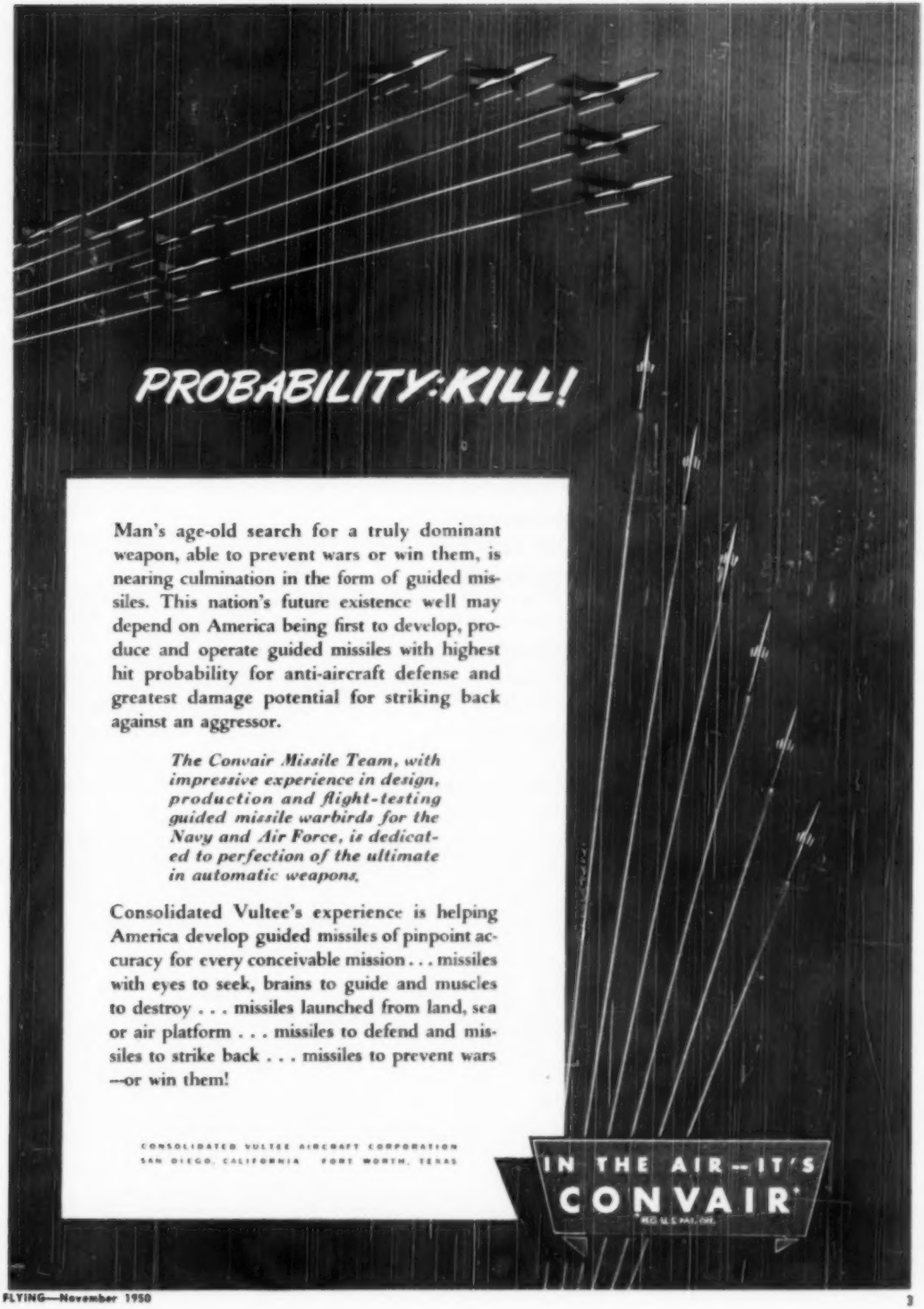

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Man's age-old search for a truly dominant weapon, able to prevent wars or win them, is nearing culmination in the form of guided missiles. This nation's future existence well may depend on America being first to develop, produce and operate guided missiles with highest hit probability for anti-aircraft defense and greatest damage potential for striking back against an aggressor.

The Convair Missile Team, with impressive experience in design, production and flight-testing guided missile warbirds for the Navy and Air Force, is dedicated to perfection of the ultimate in automatic weapons.

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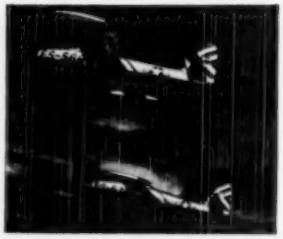

COVER: Republic Thunderjets based at Dow AFB, return from practice gunnery mission.

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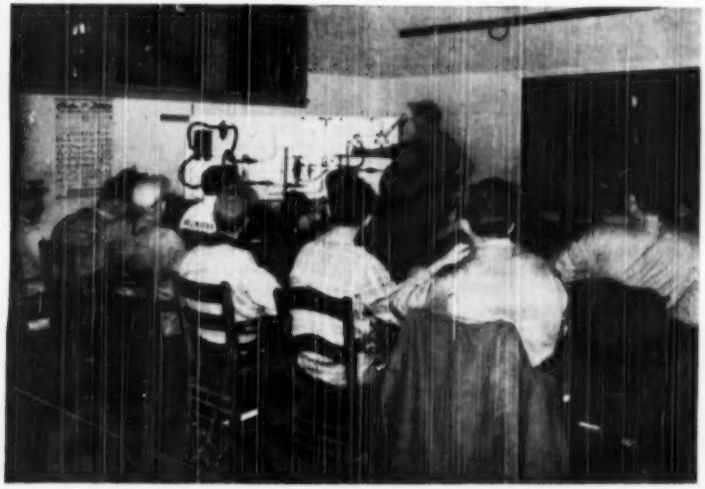

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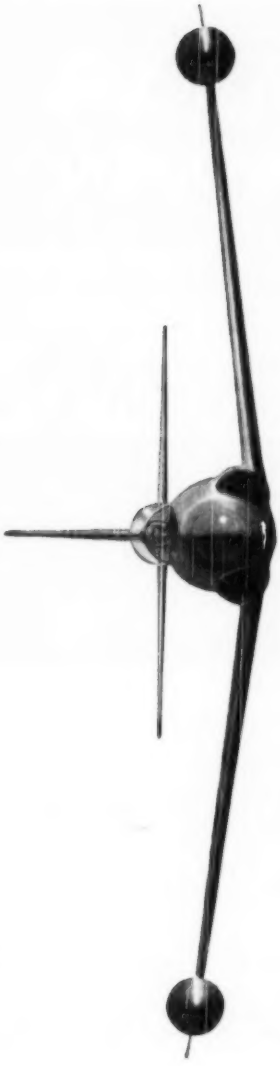
LOCKHEED'S F-94-C... TIMED FOR DEFENSE

LIKE MANY ANOTHER U. S. weapon for defense these days, the Air Force's new Lockheed jet fighter, the F-94-C, is too good to be talked about. You'll know this plane by the thrust of its speed, the sound of its power, and its purple-blue exhaust as it streaks through the night or through the roughest weather.

But beyond this physical impact of the new F-94-C thin-wing Jet, there is not much you can know about the airplane. It has more of everything—versatility, maneuverability, stability, etc.—but it's so good it's secret.

IT TOOK MORE TIME, more skill and more ingenuity to build the F-94-C than its distant World War II cousins. Good as they were, World War II airplanes were not the complicated package of speed, electronic intelligence and firepower found in the F-94-C. Nor did they require the years and years spent in the development of men, machines and materials now needed to build an airplane for defense.

It takes more and more time and planning to build an airplane, and the F-94-C was timed years ago—by Air Force and Lockheed engineers—for today's defense.



LOOK TO LOCKHEED
FOR LEADERSHIP IN JETS

LOCKHEED

AIRCRAFT CORP., BURBANK, CALIF.

THE MAIL BOX

THE NAZI INFLUENCE

The new Russian jets ["Have You Seen?" September FLYING] seem to have been strongly influenced by Nazi developments—especially the Lavochkin twin-jet fighters which closely resemble the German Me-262 [below].

GEORGE HAZEL

Manchester, N. H.

● It is a well known fact that a large number of German aircraft technicians and engineers—as well as the plans, tools, dies and equipment for various types of German aircraft—are now in Russia.—ED.

SOVIET CHUTISTS

I doubt if even the late Robert Ripley would have believed one of the statements in your "15 Years Ago" column [September FLYING]. I quote: "A Russian parachute jumper named Vokhonsky actually jumped UP when he stepped off into a strong updraft. He was then carried sideways for 25 minutes before he finally descended."

Twenty-five *seconds*, yes—but 25 *minutes*? Propaganda is the word for this yarn.

GEORGE R. LEONHARDT

New York, N. Y.

● That 25-minute descent back in 1935 was mere child's play compared to the most recent report received from Russia. In August of this year the Soviet press announced that two men, who jumped at 2,500 feet, were caught in a powerful updraft and both rose to an altitude of 4,300 feet. One of the men came down after having been aloft for 40 minutes. But the other, according to the Soviets, landed nine miles from his starting point, his chute heavily loaded with ice, after having been up for two hours!—ED.

UNAVOIDABLE DELAY

According to your "15 Years Ago" column, the September, 1935, issue of FLYING reported that "Wiley Post retired the *Winnie Mae* . . . and planned a flight to North Siberia to hunt tigers."

That issue was certainly behind the times. Wiley Post and Will Rogers died in an air crash the month before (August 15, 1935).

LOUIS F. HAUER

Cleveland, O.

● Unfortunately, monthly magazines have a hard time scooping dailies and weeklies with timely news items because of the unavoidable time lapse between preparation of copy and newsstand distribution. The September, 1935, issue of FLYING was okayed for the printer during the last week in July, went on the stands in August. Consequently, mention of the deaths of Post and Rogers had to wait for the November issue. (See this month's "15 Years Ago" column on page 52).—ED.

MORE CONTROL FOR CAA?

The reactions of A. Gehriger ["A Swiss Pilot Looks Us Over," September FLYING] help me realize how lucky we are here in the United States.

But I wonder how long our freedom of travel can last if each state is left to make its own flight rules and regulations. We will soon have 48 air dictators to rule us when we fly cross-country.

I'm 100 per cent for Federal control to be handled exclusively by the CAA which, in my opinion, has done and is doing a wonderful job of regulating aviation in this country.

JOHN E. AYER

Pillager, Minn.

WHEN AND HOW

Writing about his Polish-RWD-13 aircraft in the August "Mail Box," Herman Koplin said, "Two of these planes, which were manufactured in Warsaw in 1937, came to the United States by unknown means . . "

The two RWD-13's were first brought to Floyd Bennett Field, Brooklyn, in the

late '30's or early 1940. I am quite sure they were brought over by boat by Carl Evers and then flown by him. Evers was originally the distributor for Luscombe in this area and was also the first person to have a sales room for aircraft in the city (on Park Avenue) . . .

HOWARD LEVY
Aviation Photographer

Brooklyn, N. Y.

UNFAIR TO GROUND SCHOOLS

In his article, "CAA Writtens Are a Headache" [June FLYING], Creighton Merrell—president of the Washington Association of Ground Instructors — hurts ground school business by being unfair to his students and to the readers of FLYING.

Mr. Merrell deliberately fails to mention the latest and best texts which are available for study. He complains that the radio procedure in the *Pilot's Radio Manual* is out-of-date. The proper place to find radio procedure is in the *Flight*

(Continued on page 64)

NOTES ON CIVIL FLYING

CAB Turns Down Sisto

CAB has again refused petition of Charles R. Sisto, former American Airlines captain, for permission to apply for unrestricted airline transport certificate. Sisto was pilot who engaged gust lock of DC-4 in flight, nearly wrecking plane.

Flying Author

Paul Harvey, FLYING author and well-known American Broadcasting commentator, was seriously hurt in an automobile accident near St. Louis, Mo., a few weeks ago. Harvey, who owns his own lightplane, is now on the mend—says next time he'll fly.

Put California on the Map

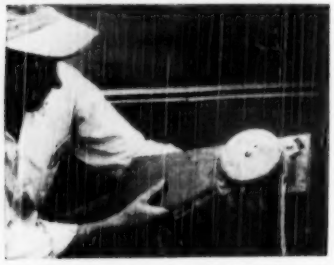
California Aeronautics Commission has completed first air navigation chart of state to include all parts on a single sheet. Scale is 1 to 1,000,000. Can be bought through Documents Section, California State Printing Office, Sacramento, for 50 cents per copy.

Viscounts in Service

Turboprop-powered Vickers *Viscount* has gone into limited service on British European Airways London-Paris route. *Viscounts* aren't scheduled for full operation on BEA until 1952.

Built-in Tie-Downs

Permanent tie-down kit has been designed by John D. Pruett, P.O. Box 41,



Jacksonville, Ala. Spring-loaded reel mounted in wing contains non-shrink webbing with short securing ropes attached. Webbing is wrapped around tie-down and secured with bow-knot tied with small securing rope.

CAB Okays Sale of AOA

On the intervention of President Truman, the Civil Aeronautics Board has approved the sale of American Overseas Airlines to Pan American for $17,450,000. The President overruled the Board's previous 3-2 vote against the merger. CAB Chairman O'Connell reportedly resigned because of the President's action.

Jet Lightplane

Cal-Aero Technical Institute, Glendale, Calif., is still developing its jet lightplane (FLYING, January, 1949), as subsequent classes work on the project. The all-metal single-placer has a high double-taper midwing and a butterfly tail. Range is 325 miles, top speed 250 m.p.h. A turbojet engine for the plane also is in development at Cal-Aero. Current emphasis is being placed on studying routing and placement of air ducts. Investigations indicate that a larger percentage of the internal volume is needed for this ducting on small planes than in a similar configuration in large planes.

Learn While You Fly

A. H. Kessler, vice-president of a St. Louis dress company, has provided evidence of the potentials of Piper's "Learn-as-you-travel" plan by soloing a Piper *Pacer* just one week after taking off on a 1,770-mile business trip. Under the plan, businessmen may rent a Piper plane from a dealer for business trips and are taught to fly en route at no extra cost. Costs are about the same as for car rental.

Jug Parachutists

Parachute jumping, under government sponsorship, is booming in Yugoslavia. Zagorkah Speechunovich (see cut), who made a parachute jump for the first time this year, recently jumped 25 times in one day at Novi Sad. Another Yugoslav, Junko Lootovuz, jumped 132 times in one day.

Untieing Knots

CAA facilities and services will adopt knots and nautical miles as a single military-civil standard of measurement for speed and distance in air navigation effective July 1, 1952. The Air Force and Navy standardized on the nautical mile in 1946. DME computers and similar instruments will be standardized on nautical miles as well.

Cancel Parks Certificate

CAB has directed that the feeder certificate awarded to Parks Air Lines, Inc., be nullified. It has awarded the north central portion of the Parks route to Mid-Continent Airlines and the Mississippi Valley and Great Lakes portions to Ozark Airlines. Parks is fighting the decision which was largely taken because of Parks delays in activating its system.

Explorer Scouts

Continental Air Command has new cooperative program with Boy Scouts of America, by which 6,200 Explorer Scouts, 14 to 18 years of age, spent one to two weeks at Air Force bases the past summer. They received instruction in the latest developments in aviation, meteorology, communications, and maintenance.

Wyoming Cuts Back

Wyoming's state aeronautics director, C. K. ("Buddy") Faught, has recommended that the state's airport development program be curtailed as an economy measure and activities limited to projects requested by the Department of Defense.

Death to Gypsy Moths

Massachusetts has been conducting one of the largest airplane-spraying campaigns in history against the destructive

gypsy moth. Four Stearmans, a C-46, and two Hiller helicopters have been spraying 400,000 acres of woodland with a DDT oil spray.

Wilderness Pilot

Blaine Stubblefield, ex-World War I pilot and FLYING contributor, now owns big twin-engined cabin cruiser, *Chief Joseph*, which makes run of 212 miles through famed Hells Canyon of Snake River (Idaho), hitherto inaccessible region. Trip lasts one to two weeks, and *Chief Joseph* can haul five to 10 persons.

Bar to Faster Planes

Design of the human body is becoming the main stumbling block to faster military planes, says Dr. N. E. Edlefsen of North American Aviation. Interception of enemy planes will be done automatically. The human pilot will merely "go along for the ride," supplying intelligence in the plane which would be difficult to build electronically.

Changes at Dallas

Dallas Aviation School, Love Field, Tex., which has trained more than 20,000 pilots and approximately 8,000 mechanics, will be run by Aviation Activities Co., and directed by W. L. ("Cuz") Ross, a member of the school's staff since 1933 and training supervisor since 1945.

Airport Transportation Solved

Airport Auto Rent is a new company operating in conjunction with Southwest Airmotive Co., Love Field, Dallas, Tex. The company rents 1950 Buick sedans for 50 cents an hour, plus 6 cents a mile; $5 a day plus 6 cents a mile; or $25 a week plus 6 cents a mile. Paper work is handled by regular SAC personnel on a 24-hour basis.

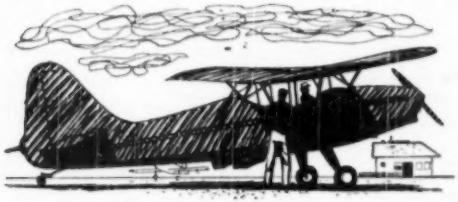
PLANE FAX

How new gas helps protect cylinder heads, rings, valves, spark plugs

"If you've had trouble with high head temperatures, particularly with back cylinders on opposed or in-line engines, you'll be glad to know Chevron 80/87 Aviation Gasoline helps keep 'em cool," reports Cecil Reid, owner of busy Hillview Airport.

For cooler flying, quieter take-off and better performance under all conditions, use Chevron 80/87. Okayed by Pratt and Whitney for engines up to 600 hp.

"Dusters use 'RPM' because it can take a beating"



"The hardest abuse a plane can get is crop dusting. You've got to have a good oil to keep engines turning free and clean during those wide-open throttles on pull-ups, and when you're hedge-hopping through bugs, dust and grit. That's why our L-5 Stinsons use nothing but RPM Aviation Oil.

"There's no question about it: the combination of 'RPM' and Chevron 80/87 gives engines longer life with better service and fewer repairs."

TIPS OF THE MONTH

"Three rules for happier flying"

1. Carry lighter loads when leaving high-altitude airports—or you may stall out on take-off.
2. Reverse tires regularly for longer, safer wear.
3. Memo to wives—when your husband starts on a cross-country, *insist* that he stay away overnight rather than buck bad weather coming home.

Cecil Reid, owner, Hillview Airport

Quick picture of

REID'S HILLVIEW AIRPORT

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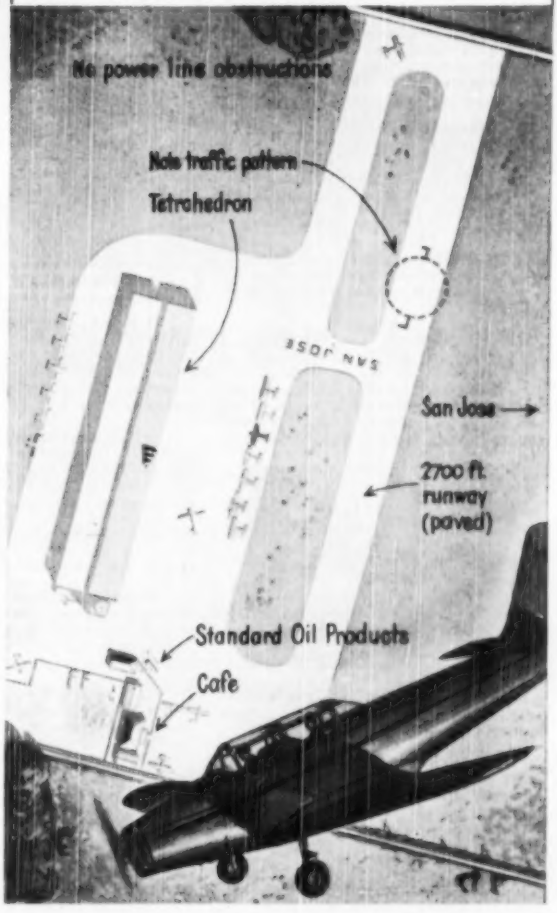
First Bay Area civilian field to open after the war • All-steel hangars for 78 planes • Flight training, CAP, rental & charter service • Free services for all visitors—windshield, air, reservations • Complete line, Standard Oil products.



CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

MILITARY NEWS

THE WAR IN KOREA

. . . **First RAF planes** in Korean campaign were Sunderland flying boats. A squadron sent to Japan from Hong Kong was radar-equipped, presumably for anti-shipping and anti-submarine patrols.

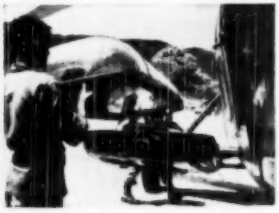
. . . **Korean submarine** crews are reportedly being trained by the Russians.

. . . **By the latter** part of August, UN airpower had destroyed virtually every Korean bridge south of the 38th Parallel.

. . . **Ten Mustangs** given to South Korea at beginning of war have been flown by U. S. volunteers headed by Maj. Dean E. Hess.

. . . **Navy's Korean** force in late August totalled 150 ships and 90,000 men.

. . . **Battlefront medics** in Korea are evacuating wounded in a special litter compartment fastened to side of helicopters. Used for the first time in a



war, the 'copters are speeding men to rear hospitals in record time. Litters have plastic tops.

. . . **Marine pilots,** who figure their aircraft are merely extensions of the infantry's bazooka and automatic rifle, regularly strafe targets less than 200 feet ahead of friendly troops—and at altitudes as low as 50 feet, under the arc of enemy mortar fire.

. . . **Korean war** should not have surprised military leaders. On March 10, over three months before Red invasion, General MacArthur's intelligence officers reported to Washington that the attack would occur in June.

. . . **Canadian North Star** transports, carrying UN troops to the Korean war theater, have a crew of four—plus two stewardesses!

. . . **Valley Forge,** first U. S. aircraft carrier to see action, carried Grumman Panthers (F9F's), Grumman Bearcats (F8F's), Grumman Avengers (TBM-3's and TBM-3W's), Douglas Skyraiders (AD's) and Chance-Vought Corsairs (F4U's).

. . . **Brig. Gen. E. A. Craig,** Marine commander in Korea, uses a Sikorsky HO3S-1 helicopter to check front-line command posts and activities.

. . . **Shortage of pipes** needed to extend fuel lines to wingtip tanks threatened to reduce an F-80 squadron's time over target early in the war. Then a mechanic thought of using Jap-made curtain rods—which filled the bill exactly.

. . . **Crew members** of a Navy Privateer patrol bomber reported they were attacked over Formosa strait early in the war by two U.S.-built Mustangs with Communist markings.

FROM OTHER FRONTS

. . . **A British pamphlet** on atomic warfare explains that deaths from atom bombing are attributed to three causes: (1) actual blast (50 to 60 per cent), (2) heat-flash (20 to 30 per cent), and (3) radioactivity (15 to 20 per cent).

. . . **Air defense plans** for Western Europe are standardized. Squadrons of French, Belgian and Dutch airmen all fly English jet fighters. Technique and equipment are approximately the same for the Continental countries, and detection and air-ground coordination are based on the same methods. English is used for orders and directives.

. . . **French air force** used paratroops in Indo-China recently to repulse Communist guerrilla forces. The French forces, however, have no heavy aircraft in Indo-China and are flying obsolete planes.

. . . **USAF** has about 10,000 men and 180 planes stationed in England.

. . . **U. S. is sending** jets to Formosa to bolster piston-engined air force of the Chinese Nationalists, a press association reported in August.

. . . **Air Force** changed mind about withdrawing units from outlying Aleutian bases. Before Korean war, a number of service units had been scheduled to return to mainland.

. . . **Aircraft** of the Soviet Twelfth Wing have been sighted in daily flights over Shanghai area of Red China.

. . . **British air defenses** of Hong Kong are weak. Only two squadrons of Spitfires (about 24 planes) are operating from the vital English base.

. . . **Advocates** of a military pact with Spain point to fact that Iberian peninsula has Europe's three biggest and best airports, capable of handling jet planes and B-36 bombers. Spanish air force has about 1,500 "excellent" pilots but only about 200 obsolete aircraft.

. . . **Soviet army** has about 5,000 transport planes, capable of dropping some six divisions and their equipment behind enemy lines. When the Korean war broke out, the U. S. Air Force had only enough planes to move one airborne division.

HERE AT HOME

. . . **Automatic opening** parachute is designed for high and fast flying USAF airmen. At right, Capt. C. G. Whitney

of Air Materiel Command sets two tiny dials—a timer and an aneroid unit—prior to take-off. If he should later be forced to bail out, he needs only to pull the handle pointed out at left and the pre-set mechanism will open the chute when he has cleared the plane and fallen to a safe altitude.

. . . **Grumman Panther,** Navy jet now fighting from carriers off Korea, is equipped with six five-inch rockets, four 20-mm. cannon. It also carries two 1,000-pound bombs.

. . . **Martin** is now delivering the P4M-1 (Mercator) to Navy squadrons. The long-range patrol bomber is powered by

two reciprocating and two jet engines. Nineteen Mercators have been ordered.

WHAT THEY SAY

. . . **Defense Secretary** Louis Johnson: "The Korean situation, I hope, is a six or eight month proposition."

. . . **B. Michael Gladych,** Polish fighter pilot writing in August, 1949, FLYING: "In the unlikely event that we had to play for keeps tomorrow, we might find ourselves in the strange spot of rummaging around in scrap heaps to find usable F-51's and F-47's to bridge the gap."

. . . **Unidentified North Korean,** writing in captured diary: "Wish we had air power to fight theirs. Do not see how we can fight a war without air power. What will we do without it?"

. . . **Maj. Gen. Emmett O'Donnell,** commander of Far East Bomber Command, after first tactical saturation raid of war: "I am not enthusiastic about the tactical use of B-29's as a military maneuver."

. . . **Maj. Dean Hess,** head of South Korean air force advisory group, when asked how many missions he had flown: "Gee, I've lost count."

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in peace or war

A MESSAGE TO YOUNG MEN . . . AND PARENTS

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- ☐ Drafting & Design

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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

That's the Cruisemaster!

Here at long last is a conventional personal airplane that every pilot can fly with the greatest of ease! Designed expressly for those who want airline speed and comfort with the simple operation and economy of a trainer, the Cruisemaster is as friendly as a pup and as gentle as old Dobbin in the hands of every pilot. It's the airplane for the whole family, farm and business.

Like all Bellancas, this newest member of a traditionally fine line of history making airplanes has that built-in, easy gentleness that takes the superman idea out of flying and makes it as effortless as a Sunday afternoon on the front porch. It's the airplane for every pilot, male or female, young or old. See your dealer for a demonstration today or write us for complete information.

PERFORMANCE PLUS! 190hp Lycoming engine. 180mph cruising speed. 43mph landing speed. 1400 fpm rate of climb. 700 mile range. Hartzell controllable pitch metal propeller. Radio (VHF optional). Foam rubber seat cushions. Fully adjustable front seats. Controlled cabin ventilation. Cigarette lighter on panel with ash trays at each seat. Fiberglas insulation. DuPont nylon fabric combined with genuine leather upholstery. 4 place-full gas load ease of operation. 80 lbs. baggage. Giant sized 10 cu. ft. compartment approved for 198 of luggage or cargo! Hydraulic retractable landing gear!

FAF $9,500.00

BELLANCA

AIRCRAFT CORPORATION

NEW CASTLE • DELAWARE

Bill Renshaw
State Fairgrounds
Indianapolis 5, Ind.

VIA AIR MAIL

Flying Farmers, U.S.A.

HOW TO STOP WARS

Had Congress listened to mid-western Flying Farmers, the Korean War might never have occurred, says L. Kenyon Wyckoff, president of the group. Wyckoff points out that his organization asked Congress in August, 1949, to see that the Defense Department gave more funds to the Army, and Marine Corps and the Navy.

Wyckoff also calls attention to the hundreds of letters FF's sent to Congress a year ago asking that at least half of our aircraft carriers be de-mothballed. Wyckoff concludes, "We are also convinced that work should be resumed immediately on the aircraft carrier, *The United States*."

* * *

LIST THE STRIPS?

"Let's list all farm landing strips on State Aeronautical Maps." That's the gist of many letters received as a result of our asking *why not* in July FLYING.

Only one writer, Junior Delkamp of Highland, Wis., voiced an objection. Delkamp raised the liability question saying, "My strip will never be listed as long as I can be held liable if someone gets injured landing on it."

There has been a lot of loose talk about liability. To set our thinking straight this column asked Straley Thorpe, legal counsellor for mid-western Flying Farmers, if the owner of a landing strip could be held responsible for injury to someone engaged in landing or taking off. Thorpe in his reply said, "Any pilot landing on a private strip which is not used for commercial purposes accepts the risk incidental to landing. This is true whether it is on a map or not." Thorpe pointed out that the owner of a strip could be held responsible only where some dangerous obstacle, which is concealed, entraps a pilot.

Nebraska is doing a fine job with its state chart and directory, according to reader H. J. Gengler, Hartington, Neb., who adds: "I agree that all strips should be listed on all state charts."

* * *

AIRPORT CASH

Flying Farmers, turned airport operators, are using native ingenuity to bring in extra cash in the form of aviation business.

George Lockwood of Frankfort, Ind., has constructed a "drive in" on his airport, which is also getting a nice play as a "fly in." Excellent food at reasonable price helps.

Delbert Koerner of Kankakee, Ill., started building television towers in spare moments. Now one mechanic is busy most of the time on towers alone.

When business slackened at his airport, Kenneth Biddle of Sheridan, Ind., moved a screw machine to the airport. During spare time airport personnel operate the machine.

HEAVENLY AIRSTRIP

Flying Farmers in the Wheatfield, Ind., area have turned an abandoned railroad into what might be called a "flight strip to heaven." The 2,800-foot flight strip is believed to be the only one in the nation that terminates at the front door to a church. It was built by Flying Farmers at a cost of less than $600.

Both the strip and church have unusual backgrounds. Much of the carpentry and masonry on the church was done by the minister, Rev. Charles G. Morse, now 72. Rev. Morse recently received the Jimmy Fidler award, and the church was given nationwide publicity in a popular picture-type magazine.

Seventy-eight Indiana Flying Farmers recently made a mass pilgrimage to the church, flying in 27 planes.

* * *

CONSERVATION AIRLIFT

This column has received many inquiries on how to stage "A Soil Conservation Airlift." We have gathered a lot of material, mimeographed it, and are now ready to send it out upon request.

Under the capable leadership of Ralph E. Young, Agricultural Aviation Coordinator, Ohio, continues to lead the nation in these events. Young says, "We've taken the airplane out of the roller-coaster class and put it to use as an aerial classroom in which farmers can study their farms."

In one recent month, 47,000 air miles were traveled in nine Soil Conservation Airlifts in the Buckeye state. More than 1,000 farmers had a chance to study their farm management problems from a new angle. Fewer than 10 per cent of them had never been in a plane before.

Ohio farmers are also making the airplane pay big dividends in controlling insects. In Fairfield county alone, 5,000 acres of legume meadows were recently saved from spittle bugs. Control which was 100 per cent effective saved an amount equal to 5,000 tons of hay, worth an estimated $150,000.

* * *

MARK ONE UP

Illinois Flying Farmers expect the next General Assembly to give the state an air marking program second to none. During the past three years the State Department of Aeronautics has collected a total of $50,000, through an annual registration fee of $1 for each plane and each pilot. Joe McLaughlin, Director of Aeronautics, has indicated that he will ask the lawmakers to give his department the green light on using the money for air marking and other navigational aids.

Flying Farmers, who generally opposed the enactment of the law, recently reversed themselves and asked that the funds be used for air-marking. It is believed all opposition to the registration fee will disappear if the money is used to airmark the state.

If you think that statuesque blonde in the airport eatery is a fickle number, how about that unpredictable little charmer they call "Weather"?

Who knows the number of promising young pilots she's

lured aloft with her sunny smile, only to make with that "wind and rain in her hair" routine!

That's why, and this is for the record, we want to encourage the use of communications equipment in today's putt-putts. That dame "Weather" likes nothing better than to give you a bum steer!

And . . . unless you're one of those rare fly-boys who's on to her shenanigans, two-way radio will keep you up-to-date on her changes of mind.

Two-way radio, or even just a receiver, will keep you posted via the Weather Bureau's vast facilities. You'll fly safer—using the same data as commercial pilots use.

AVIATION OIL CAN BE FICKLE, TOO!

That's why a flock of valve-happy, ring-happy pilots are going steady with Gulfpride Aviation Oil—Series D! She's true to every one of 'em!

Man, has she got class—the finest detergent dispersant oil for horizontally opposed engines in captivity! And, fellas, she's the only aviation oil put through Gulf's exclusive Alchlor process to remove those extra carbon and sludge formers!

Get hep! If you want to increase those periods between overhauls up to 100%, make a date with Gulfpride Aviation Oil—Series D—the very next time you fly!

Don't worry—there's enough for everybody!

GULF

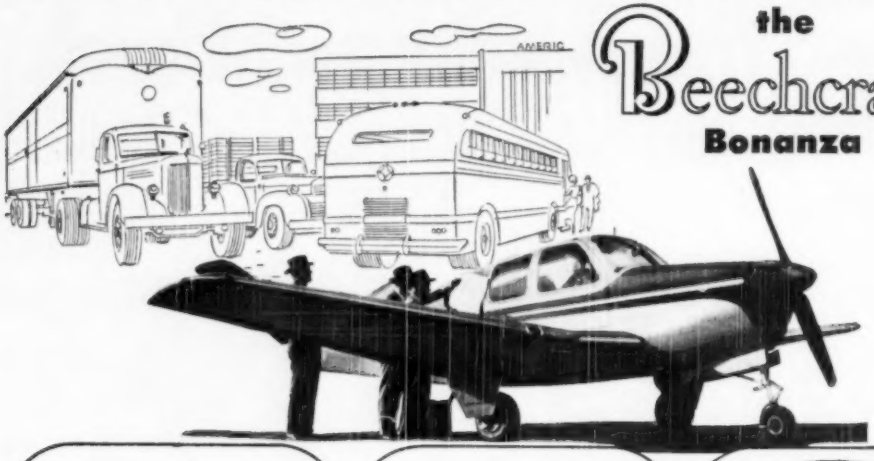
AVIATION PRODUCTS

DON'T TRY FORMATION FLYING BECAUSE....
YOUR WING'S NO MATCH FOR ANOTHER GUY'S PROP AND..
YOU MIGHT SPILL 2 TANKFULS OF THAT WONDERFUL GULF AVIATION GASOLINE! (YOURS AND HIS)

Gulf Oil Corporation . . . Gulf Refining Company

Add this "expediter" to your transportation set-up:

the Beechcraft Bonanza



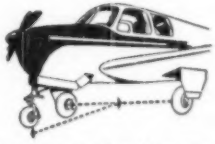
Faster trips. Cruising at a 170-mph clip, your management men can spend *all* the time they need on "field work." You have complete mobility of action—the Bonanza is fully equipped for day and night flights.

. . . at longer range! 750-mile range can be lengthened to 940 or 1,145 miles with installation of 10- or 20-gallon auxiliary fuel tanks. In the Bonanza you can *keep moving* to your destination.

Travel in style—and comfort! The cabin is *soundproofed*, handsomely tailored, and *big*. Four ride in "stretch-out" comfort. W-I-D-E limousine-type door. Arm rests, ash trays for all. Three map pockets.

Takes short fields "in stride." Take-off horsepower rating now 196 h.p. at 2,450 rpm. Landing gear lowered in 7½ seconds, raised in 8½, at 105 mph. New Beechcraft propeller develops greater static thrust.

And just compare this economy! Fuel consumed at "passenger car" rate – 9.5 gallons per hour! Bonanza uses only 56% of engine's rated take-off horsepower at cruising speed. Less wear, fewer overhauls!



Unsurpassed safety. Steerable nose-wheel gives greater maneuverability, more positive control. Wide and long wheel base smooths rough field landings. All-metal framework far surpasses CAA requirements.

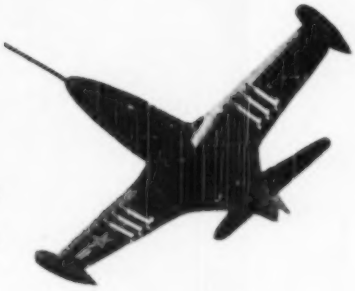
Features like these have put the Model B35 Beechcraft Bonanza 'way out in front! Get the *full* story about this sturdy, economical business plane from your nearest Beechcraft distributor or dealer today. Or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A., on your company letterhead.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

Beechcraft
BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

FLYING
VOLUME 47, NO. 5
NOVEMBER, 1950



Carriers operate as 'front-line' strips for Navy pilots supporting the infantry.

THE NAVY Strikes in Korea

By JOHN A. GILES

THE KOREAN WAR has brought a resurgence of the old Navy spirit all the way from the "Fancy Dan" air admirals down to the lowly seaman. It is in the air at the huge, sprawling Pentagon—where also sits Gen. Omar Bradley, the chairman of the Joint Chiefs of Staff who once angrily flung down the "Fancy Dan" title in hearings on Capitol Hill—and at Navy stations throughout the land.

That spirit began sweeping forth like ocean tides as early reports of far-ranging carrier-based aircraft, ofttimes in the strange role of supporting dog-tired GIs stumbling back through the mountains and plains, filtered in from the battlefields of Korea.

"You'll find a lot of red faces [among Army and Air Force brass] around the Pentagon," commented one of the top air admirals. His was not an "I told them so" attitude, although he had obvious reference to the bitter inter-service row aired before the House Armed Services Committee in 1948. The Navy now (*Continued on page* 46)

CAP pilots will have more to do, even if other private flying is restricted.

The War and

ADAC blueprint recognizes important role of personal aircraft, but the military situation keeps plans fluid.

WHAT is going to happen to private flying in the U.S. as an outgrowth of the fighting in Korea?

No one knows—for sure. There have been no rules promulgated any more than there are rules for the conduct of the "war" in which our troops are now engaged.

If the war is confined to Korea, and ends there within a few months with a victory for the United Nations, there probably will be little effect on private flying other than the minimum restrictions now in effect.

If the Korean War drags out there are as many possible controls on private flying as there are degrees of hostilities between the current "police action" and World War III.

Certainly, everyone even remotely connected with aviation understands the vast difference between private flying prior to World War II and private flying today. In the earlier period, private flying was largely "pleasure" flying; today the trend is toward use of the airplane as a tool of industry, of agriculture, and of trade—all important to any war effort in which the U. S. may find itself.

The Aviation Development Advisory Committee has made lengthy recommendations to D. W. Rentzel, Administrator of Civil Aeronautics, for the maximum utilization of these resources under varying degrees of readiness for war. These recommendations will serve, at least in part, as a blueprint for future action. Here are some of the probabilities as well as possibilities in the control line.

Pilots

Already there are certain restricted areas and defense areas where filing of flight plans is "requested and urged." These areas appear certain to increase in number—and the "request" probably will be changed to a requirement. Currently, the areas where flight plans are urged are in the vicinity of the atom bomb plants at Los Alamos, N. M., and Oak Ridge, Tenn., as well as the entire Seattle-Hanford areas (see accompanying map). Also, aircraft approaching the U. S. coasts, both Atlantic and Pacific, within areas shown on the map, are requested to file flight plans or to identify themselves when asked. Otherwise, Air Force fighter aircraft may intercept private planes to make identification.

Small areas in the airspace directly over or within sight of the actual atom bomb plants are definitely "out of bounds" to all types of aircraft except military. These

Executive aircraft from eight states assemble at Southwest Airmotive in Dallas for the Texas State Fair. Private planes like these, especially those in the Civil Air Patrol, can perform many wartime duties—courier service and patrol work—on a greater scale than in past war.

Private Flying

By G. T. KELLOGG

Flight plans are not yet mandatory in the areas depicted on this map, but they are likely to be soon. There are three types of restricted zones. (1) Coastal identification zones. Aircraft approaching the coasts are requested to file flight plans or to identify themselves when asked. (2) Special safety zones in the vicinity of atomic plants. Flight plans are urged in these areas and planes within sight of the atomic plants will be intercepted by military fighters. (3) Designated mountainous areas. The Defense Department requires that flights in mountain areas be made at not less than 2,000 feet above the highest obstacle within 25 miles on either side of course unless flight is on a designated airway or air route for which specific minimum altitudes have been set.

restrictions will be toughened rather than relaxed, should the war continue.

Even now, CAA officials are studying plans and setting up machinery for handling all aircraft movements on a flight-plan basis. This would require a communications network that could handle a tremendous volume of flight plans and would of course necessitate suitable communication links between "control airports," which are discussed later in this article.

CAA also is considering a requirement that all itinerant aircraft—that is, private aircraft, personal aircraft, and all non-scheduled operators other than military—be equipped with Very High Frequency transmitters, so that they may be picked up on VHF-Automatic Direction Finders, either by military or other airports of surveillance to be established. The VHF-ADF equipment (which CAA has ordered in substantial quantity) translates the VHF radio signal of a transmitting aircraft into a line of light which shows either on the scope of a surveillance radar or on a small dial operating separately from a radar tie-in. This line of light gives the compass bearing of the transmitting aircraft and identifies to the radar operator the "blip" on his scope which represents the aircraft.

Another regulation in the immediate offing for airmen will probably provide that every pilot get an official CAA identification card, similar to those carried by members of the armed forces. In addition to proving identification, the card will bear the place and date of the airman's birth, citizenship, evidence of a loyalty pledge, fingerprints, photograph, description, full name, and signature.

This "I.D." card probably will not be mandatory at the outset but would be required of all pilots if total emergency conditions are proclaimed.

CAA is considering a similar regulation to cover certificated ground personnel.

Plans also are under way to encourage all civil aircraft owners to install functioning two-way radio. Should a total emergency be declared, aircraft not so equipped probably will be grounded.

In the event of total emergency, it is likely that pilots would be required to register with the airport controller at each point of origin, terminal, and stops en route. One method of accomplishing this would be through the issuance of a "flight dispatch card" by an approved airport controller, identifying aircraft, pilot, passengers, destination, time and date of departure. (*Continued on page 60*)

In Beech Bonanza, Lear Autopilot showed author how easy private flying can be. Pilot is Merrill Meigs, aviation authority and Chicago newspaper publisher.

Autopilot kept Cessna 195 on course despite rough air. Plane is owned by Clarence Morris (left), San Diego contractor.

The only trouble with using an autopilot is that you will never again be satisfied to fly without one.

Robot Pilot FOR LIGHTPLANES

By HY SHERIDAN

Contributing Editor of FLYING

FOR YEARS everybody has been talking about autopilots for small airplanes, and now Bill Lear has gone and invented one. It is known by the straightforward name of Lear Autopilot, in case you wondered about such things, and what it will do to the problem of flying lightplanes cross-country is something that every pilot ought to know about.

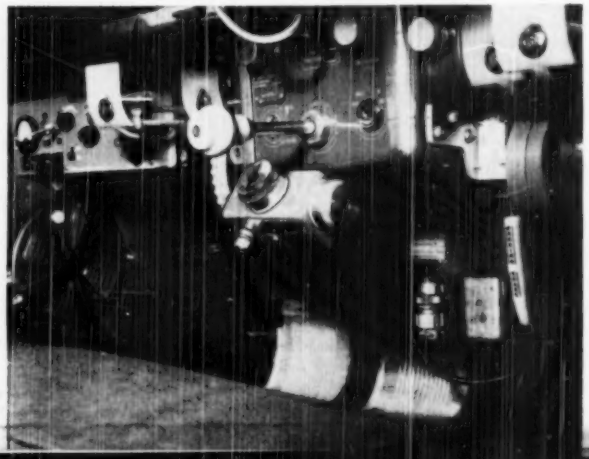
If anyone had asked me offhand I would have demanded to know why a guy would want an automatic pilot in a light airplane. But I fearlessly decided to look at the facts no matter what the process did to my opinion.

With the help of the editor of FLYING I lured into range two small airplanes complete with the pilots thereof—both automatic and human. I might say right here that one of the advantages of an automatic pilot over the usual co-pilot is that the automatic pilot remains silent. But there are other advantages. The autopilot for lightplanes is a new departure and one of the most important in recent years.

The first of the planes equipped with the autopilot that I flew, or vice versa, was a Cessna 195 winged into Chicago by its owner, Clarence Morris, a building contractor of San Diego.

Now, I want to say that I have had some experience with the automatic pilots in the larger airplanes, having flown them off and on for several years, and so I should know something about them. I

Autopilot controller in Bonanza mounts neatly below the throttle. See instructions on page 50 for the step-by-step operating procedure.



Lear Autopilot in Cessna 195 is so successful that Owner Clarence Morris says that if he had to do without it he would stop flying.

should know, that is. So Mr. Morris and I went up, taking the Cessna with us, of course.

I noticed a little box about the size of a package of cigarettes mounted on the control yoke about in the middle so it would be handy to the pilot and to his seat companion. That turned out to be the control box for the Lear autopilot.

Well, the air was as rough as a nudist's fanny and I says to myself if that pilot was going to work, it was going to have to lay its ears back and go to it.

Mr. Morris turned it on with a little toggle switch and then he told me to go ahead and play with it. It was all set. With the big ones that I am used to, you have to do a lot of trimming while lining up some reeds, but with this one all you do is flip the switch.

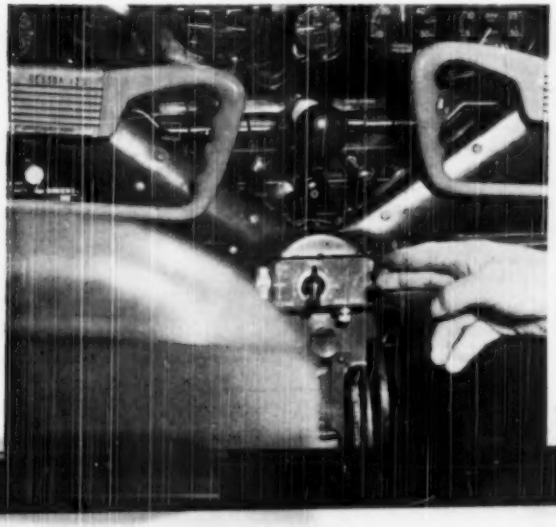
The first thing that I wanted to know was if it could hold a course. The Cessna was bucking and sunfishing up to that time and while I was flying it I was as busy as a coed in a convertible. Well, I set a course for 280° and waited. At the end of 50 miles we were still on 280°. And the airplane held its altitude within close limits, too.

The big autopilots I know won't do that and the fact is that the human pilot has so much work on the pitch control knob that a good many of us would rather fly the airplane ourselves. Of course the big pilots have a special altitude control which is hooked onto what amounts to an altimeter so that the pitch knob changes are done for you, but you can't use that automatic feature when climbing or going down hill; then it is much easier to fly her by hand.

Not so this little autopilot, though. It is steady flying level and it is just as steady in climbs and in descents. By the way, it will soon be available with an altitude control as an extra, and also with an automatic approach "coupler" for blind approaches to ILS runways.

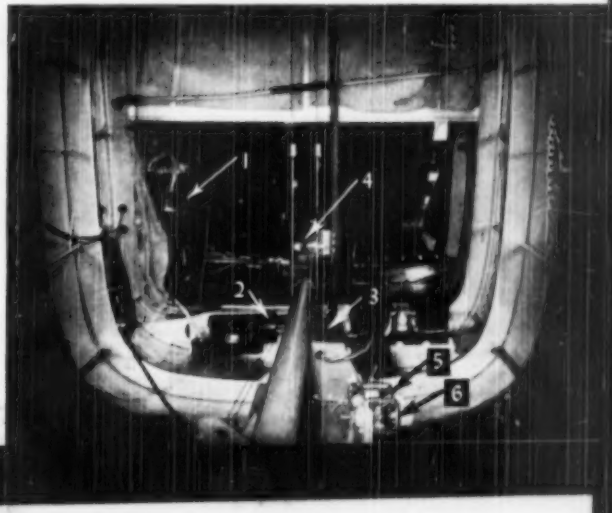
I tried all kinds of maneuvers. You can set the Lear for straight away, for climb or descent, or for any degree of turn, on the level or climbing or descending, with the exception that it has built-in safety limits. For example, you cannot climb steep enough nor turn sharply enough to stall. If you set the turn knob over the ship will keep on turning until you want it to (*Continued on page 49*)

Controller in Cessna 195 shows flexibility of mounting. It is slightly larger than pack of cigarettes, weighs less than a pound.



CESSNA INSTALLATION

There's more to the autopilot installation than the simple-looking flight controller in the cockpit. Components behind Cessna 195 baggage compartment are (1) amplifier, (2) trim servo, (3) three-axis servo, (4) followup, ailerons, (5) followup, elevator, (6) followup, rudder. Complete installation weighs 36 pounds.



There's No

Production lines are rolling but this year's output will be only 1/10 of 1944's. Above, F-94 all-weather jets are produced at Lockheed plant.

Shortcut To Airpower

Do You Know

- ★ What bottlenecks plane builders face?
- ★ Why the Air Force changed its mind on the B-50?
- ★ How many planes the Navy says it needs?
- ★ Whether foreign plants will build U.S. warplanes?
- ★ What three manpower problems manufacturers face?

By RICHARD E. SAUNDERS

Washington Editor of FLYING

BACK in July, banner headlines blazed on American newspapers. Along with somber dispatches from Korea was the news that Congress had appropriated billions of dollars for U. S. airpower. The man-on-the-street read the headlines and commented that it was about time the Defense Department woke up.

But the road between appropriations and production is long and rocky. In July, when the big boost in spending was announced, the aircraft industry was building only 215 planes per month. With new orders, the industry will be able to expand—and by next July should be building 645 planes per month.

Compared with plane production in May, 1943—7,086 warplanes were built that month—America's production a year from now will be just a drop in the bucket.

But a start has been made. What does it mean?

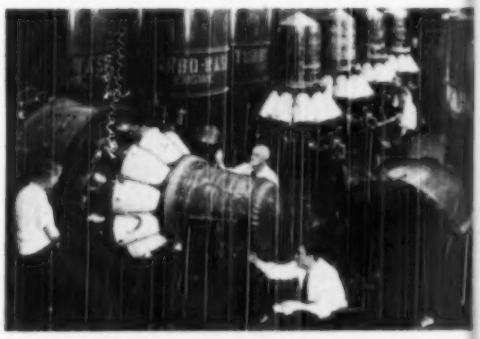
The aircraft procurement program for the current year will be tripled.

Orders for nations aided by the Mutual Defense Assistance Program will be stepped up.

The total impact will give the industry the fourth largest volume of business for any year in its history—exceeded only by 1942, 1943 and 1944.

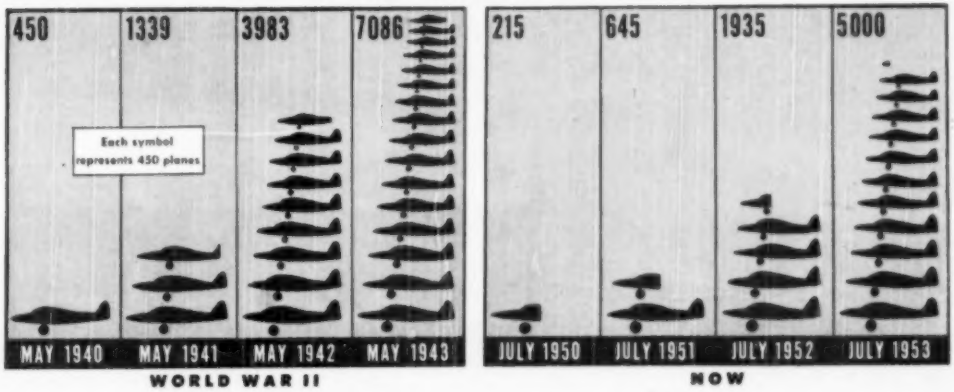
But—and this is a big "but"—production will be only 1/10 of the peak reached during the highest World War II year.

Here's the scoreboard. Authorization for planes for both services, previously fixed at a total of $2,329,000,000 for fiscal 1951, has been boosted to $6,672,100,000. This breaks down to $4,342,000,000 for the Air Force and $2,329,000,000 for Naval aviation. Plane procurement funds for the Mutual Defense (*Continued on page* 54)



Engines for Korea? Powerful Pratt-Whitney J-48 Turbo-Wasp engines pass inspection in new stepped-up aircraft program.

HOW FAST CAN WE EXPAND?

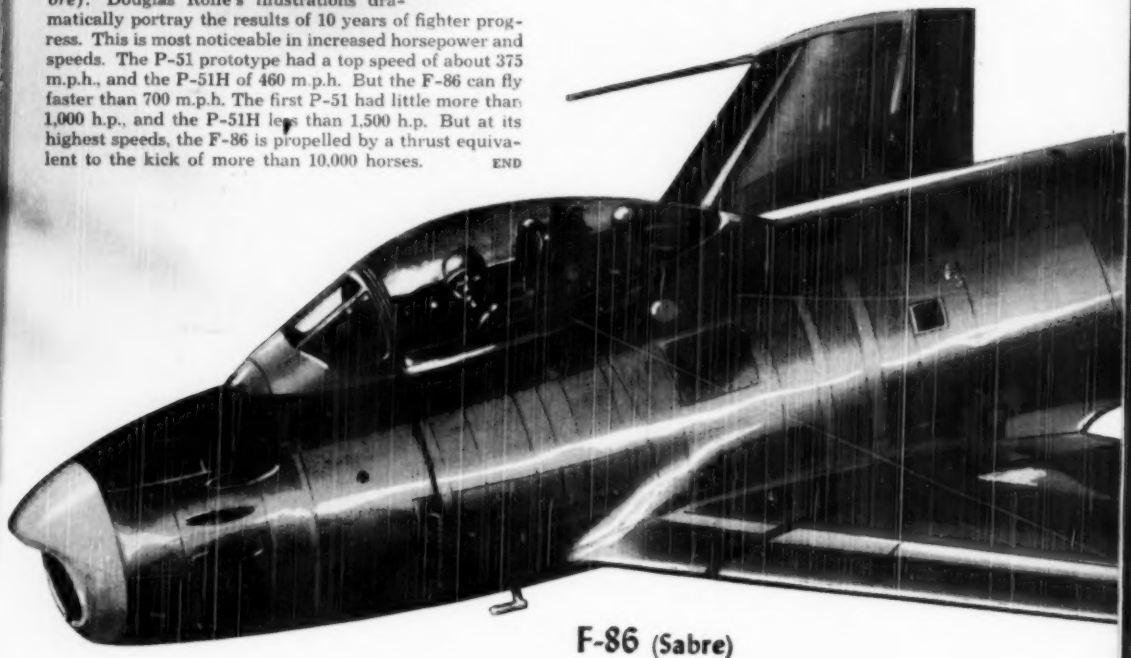


10 YEARS OF PROGRESS

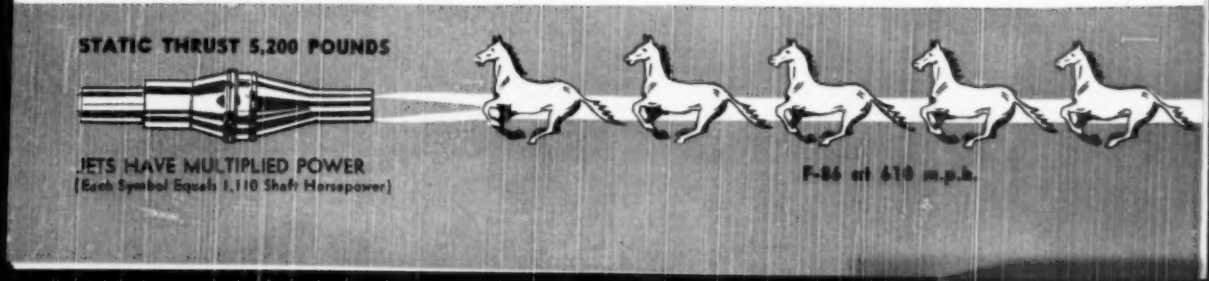
THE Mustang AND THE Sabre

TEN YEARS AGO neither of the two fighter airplanes pictured here existed. The P-51 started with a 1,150-h.p. model delivered to the British as the NA-73, beginning in November, 1941. It went on to become one of the top fighters of World War II. The Korean War has proved that the *Mustang* still hasn't exhausted its potentialities. Nevertheless, its performance, except as to range and time over target, is vastly overshadowed by its sister-fighter, the North American F-86 (*Sabre*). Douglas Rolfe's illustrations dramatically portray the results of 10 years of fighter progress. This is most noticeable in increased horsepower and speeds. The P-51 prototype had a top speed of about 375 m.p.h., and the P-51H of 460 m.p.h. But the F-86 can fly faster than 700 m.p.h. The first P-51 had little more than 1,000 h.p., and the P-51H less than 1,500 h.p. But at its highest speeds, the F-86 is propelled by a thrust equivalent to the kick of more than 10,000 horses. END

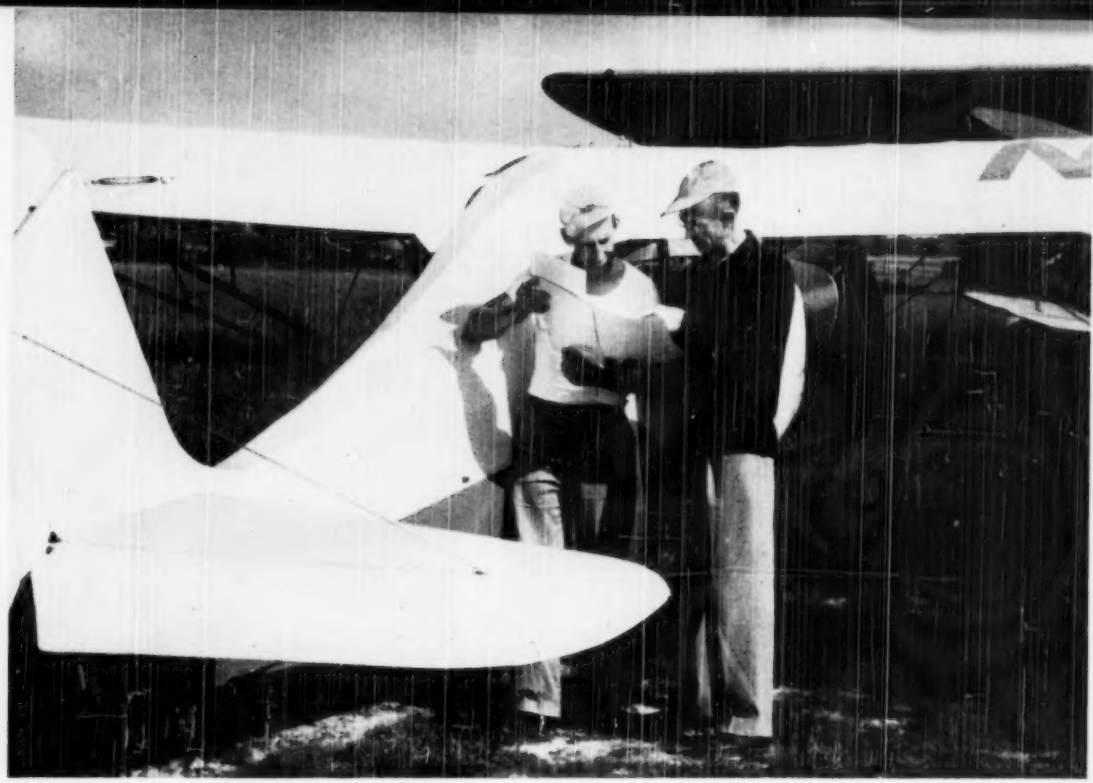
P-51H (Mustang)



F-86 (Sabre)



P-51 (Mustang Prototype)
COMPARATIVE CONFIGURATION
375 m.p.h.
460 m.p.h.
700 m.p.h.
FIGHTERS FLY FASTER
300 miles
1250 miles
750 miles
STRIKING RADIUS HAS DECREASED
ILLUSTRATION BY DOUGLAS ROLFE
P-51H
P-51
23



Author Hoadley, right, explains to potential customer the finance charges on typical lightplane. Insurance costs, which protect the finance company against damage, make cost high but insurance also provides protection to the man who is buying the plane.

HOW TO
Finance Your Plane

By ED HOADLEY

Operator of Aero Traders, Unlimited, Bloomington, Ind., the author formerly ran his own finance company and still finances airplanes on occasion. He has also investigated practices of other companies.

LAST YEAR two young Americans faced a common aviation problem. Bob Henninges and Wayne Coventry of Findlay, Ill., were determined to finish their flying training. But like so many of us, they did not have the cash to rent airplanes at something like $10 per hour for 400 hours.

Unlike many of us, the boys refused to be licked. They found a good Aeronca *Champion* at $550. Pooling their resources ($250), they financed the balance with my company.

This year Henninges and Coventry finished paying for their airplane, and have built up many hours in it. Their commercial licenses will not cost any $4,000, and when they do finish they will have added an airplane to their assets.

Not all aircraft financing is this simple. In fact, the above is possible only by a set of conditions that include (1) solid thinking, (2) favorable economic cycles, and (3) good character. But it *is* possible to finance your airplane today, and it *is* possible to fly almost as cheaply as to ride horse-back. These statements are as startling as they are true, despite opinions of a group of defeatists found around almost every airport.

Many persons are stumped by the paper-work, the "red-tape," that lays a heavy ground fog over financing. That fine print (that you never read) at the bottom of the contract is a paradox of the first order. Let's take a fair example of today's market, a used Cessna 120 at $1,000, and work out a typical case.

You are considering a time purchase. If you are a property owner, and/or a reputable citizen, first go to your local banker or finance company. They will take your personal note as security, even though they will shy like a wild horse about taking a mortgage on the airplane. By keeping the deal at home all the way, you will obtain a character advantage and a possible interest saving.

You can buy an airplane on time but the transaction involves lots of red tape.

If you can't get a loan at home, a few aviation companies will finance your airplane without undue delay or too much paper work. These companies will insist, however, on certain papers being properly filled in and, in some cases, notarized.

The papers usually include: (1) a financial statement, (2) buyer's application, (3) references, (4) affidavits or proof of ownership, (5) complete and detailed data on aircraft and engine, (6) application for insurance, and (7) the chattel mortgage or conditional sale contract. This is a big order and has scared some people right out of the picture. Last year a pilot came to me one Sunday morning to buy one of my airplanes on a time basis. He arrived at 9:30, had inspected and okayed the plane by 10 o'clock, and then wanted the papers all filled out, notarized and recorded by noon. He had a date to take his girl flying in his home town that afternoon. He didn't keep the date—in that airplane.

First, that financial statement. These are printed forms available at any bank or finance company. You have to be a fairly decent hand at bookkeeping to fill one of these out. Fill it out carefully, for it is the basis for your credit rating.

Second, the buyer's application. This form varies with different companies. It serves mainly as a character checkup. Married? Lodge member? Items that a shrewd banker can piece together and pass judgment on.

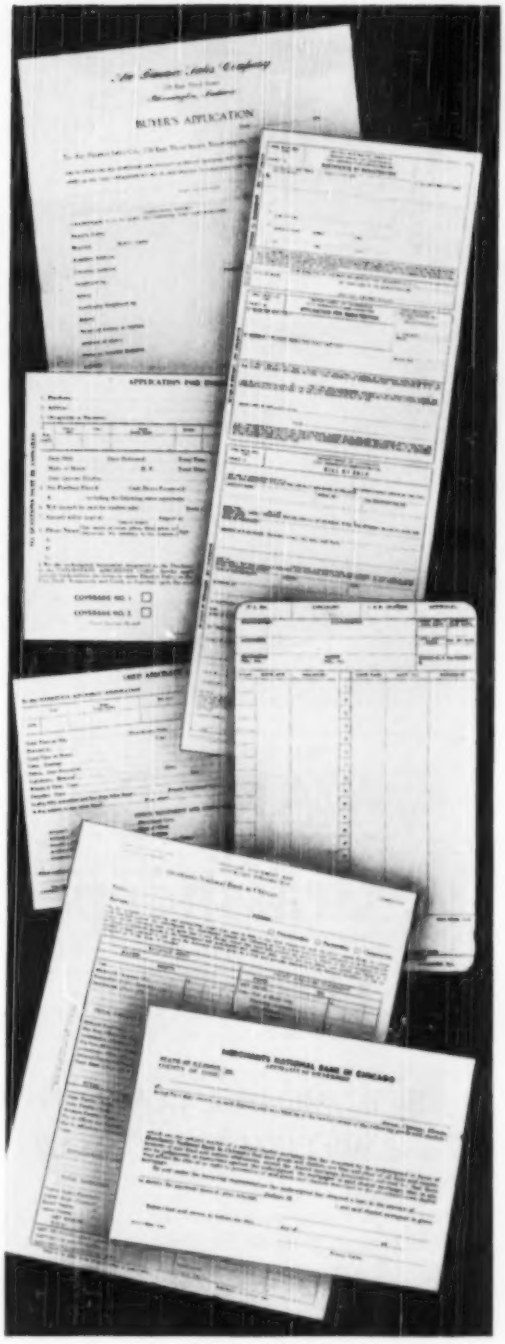
I should have known the score when I passed on Roscoe Wilson out of Chicago. The buyer's application was spotty, but Wilson had a wonderful personality. I put up $750, and a finance company near Chicago put up a like amount. We bought Roscoe Wilson an autogiro in perfect shape. He had a summer banner-towing contract that should make a million. How wrong I was. Within a few weeks I learned that the finance company's check was a complete and beautiful forgery! The sellers in Pennsylvania were screaming for their money. A few weeks later I was in possession of an autogiro I didn't know how to fly, plus letters from very irritated, defrauded Pennsylvanians. Yes, the buyer's application should be carefully filled in.

Third, references. These may be attached to the buyer's application, or may appear separately. In any event, the finance company will want them. A mortgagor must be ready to provide credit references. How good these are in court or law is highly problematical.

Fourth, affidavits, or proof of ownership. Here again the situation varies with the finance company. We insist on seeing and filing the CAA registration certificate properly signed by a Mr. George W. Haldeman in Washington, D. C. If this gentleman's stamped signature is on the ticket, there should be no cause for concern.

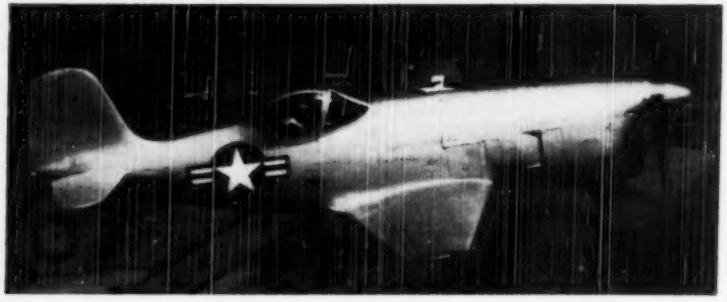
State laws are so different in regard to affidavits and proof of ownership that it's a good idea to see a local attorney for the details on your state laws.

Fifth, complete and detailed data on aircraft and engine. If there is a tear in the third bay of the fuselage, it must be reported. An aviation (*Continued on page* 62)



Borrowing process is simplified if you keep loan at home, but if you go to outside finance company, they will usually ask for financial statement, references, proof of ownership, data on plane and engine, insurance application, other papers.

New bantam class of fighters would battle liaison planes.



Bell XP-77 of World War II comes nearest to meeting authors' ideas of proposed baby fighter. It was a light, all-wood craft with 520-h.p. Ranger engine, 27 ft. 6 in. span, and 330 m.p.h. top speed. Specific proposals discussed in article are illustrated by silhouettes: (1) Gladych, (2) DeLanne, and (3) Burnelli.

WANTED: A Grasshopper Destroyer

By B. MICHAEL GLADYCH and WILLIAM S. FRIEDMAN

WORLD WAR II introduced a new character into the military drama—the grasshopper or liaison airplane. The grasshoppers were mostly off-the-shelf light-planes equipped with a radio and manned by an individual suspected of being on the fringe of lunacy.

He was able to stay alive by a technique of keeping out of range of enemy small arms fire. Few artillerymen would give away their carefully concealed positions merely to shoot him down. Fighter aircraft proved to be no major hazard, since the difference in closing speeds between the two were too great for an adequate shot.

When things got really rough, the grasshopper could turn into the target or simply land and get out of sight. During World War II, the U. S. ordered upward of 17,000 liaison planes.

The success of the grasshopper is being proved again in Korea. They have shown that they can spot artillery fire, keep scattered units in contact with each other, lay wire, haul VIPs, point out targets for the fighter bombers and even vector jets into a strike.

The liaison plane has proved itself invaluable to a land army—so indispensable, in fact, that means must be considered to deny any enemy the opportunity to use it against us.

How can we control the liaison planes of an enemy by denying them the use of the air? Since the liaison plane itself cannot be equipped for battle without destroying the performance characteristics which make it so useful, something new must be added.

That something is a special class of bantam fighters designed for the specific job of knocking out liaison planes. These baby fighters must be able to take off from the same small primitive strips on the front lines. They must have high performance, fast take-off and climb, a good top speed for short runs, and high maneuverability—plus enough firepower to knock the grasshoppers down in a single pass. Most important, they must be able to fight at the grasshopper's minimum speed so the latter cannot take refuge in flaps-down slow flight.

Since no potential enemy could afford to allow its liaison planes to be shot down with impunity, the bantam fighter must also be designed to fight other aircraft of its own class. Here are some recommended characteristics of such a plane:

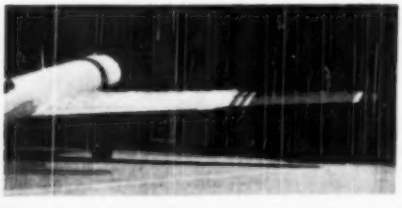
- Reciprocating engine or possibly a small turboprop engine. The engine must be of proven design and capable of using ordinary automotive fuels and lubricants for easy attachment to a ground army.
- Fixed landing gear. Simple, (*Continued on page* 55)

WINGS That STRETCH

By WILLIAM GREEN

Makhonine 123 is a low-wing cantilever monoplane powered by an 1,100-h.p. German BMW radial engine. Designer expects four-place craft to have maximum speed of 525 m.p.h. at high altitudes with its wings retracted.

Telescoping wings enable the plane to take off with high-lift wing section, then retract outer panels to reduce wing area for cruising speeds. The outer wing sections are extended (below) and retracted (above) by a quarter horsepower motor installed in fuselage.



INTRIGUE IN PARIS

"I could write an article on how I obtained the Makhonine material," writes William Green from Paris. "This chap Makhonine is a Russian and apparently he lives continually in fear of the Communists.

"He most certainly took me to be a Communist and refused to see me. By a strange coincidence, I met another Russian in a bar in Pigalle. I chanced to mention my lack of success with Makhonine. He immediately phoned the designer, made an appointment for me—after which Makhonine could not have been more helpful. Apparently my bar-mat friend was a high-up in the White Russian organization."

THE IDEAL ultra-high speed plane should have symmetrical, razor-like wings that can knife through the atmosphere.

The best slow-speed craft, on the other hand, need wings that are large, heavily-cambered, slotted and thick.

If aircraft designers somehow could combine these two wings on the same aircraft—say, by building a mechanically-variable wing section—one of aviation's big problems would be licked. Supersonic planes might be able to fly at low lightplane speeds when necessary.

In France, a Russian refugee named Ivan Makhonine believes he has found the solution. Since 1922 he has been intrigued with the idea. He conceived the idea of building a monoplane with telescopic wings—the wing outer sections telescoping into the inner sections to reduce wing area after take-off and increase it for landing.

By 1930 he had completed a flying prototype which was destroyed in 1941 to prevent it falling into German hands. Today, Makhonine has another experimental craft which he believes will pave the way to a new era in aviation.

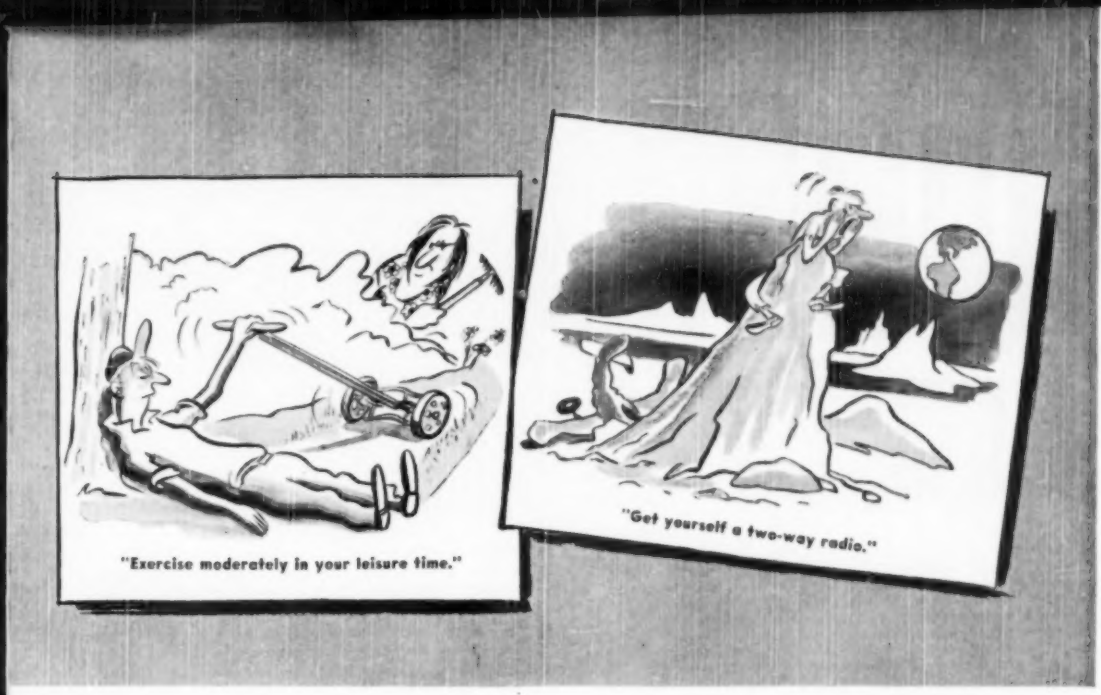
The original variable-wing model first flew on August 11, 1931, at Villacoublay military airfield near Paris. Makhonine's formula was only partial- (Continued on page 63)

"Move around in the airplane."

"Eat, drink and smoke moderately."

Does Flying Make

"Pilots, like movie stars, should always get their beauty rest."



You Tired?

Fatigue can sneak a low blow to pilots who don't get enough rest.

By HARLAND WILSON

PILOTS, like movie stars, have to get their beauty rest. Even though a few hard-bitten old boys won't admit it, even to themselves, pilots who are tired before they begin to fly, or who get tired en route, just can't do a precision job.

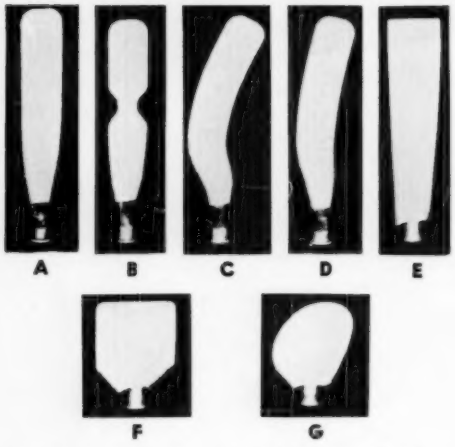
This article is not aimed at airport pilots, or at cross-country pilots who know when it's time to get down on the ground and hole up until the next day. It is designed to inform pilots who are inclined to stretch their luck—who if they were driving an automobile, would be getting up at dawn and driving until after sunset.

Under average conditions, every pilot knows that it is a lot more fatiguing to drive an automobile cross-country, through the milling traffic, than to take an airplane and fly over it all. Nevertheless, pilots should be able to recognize fatigue symptoms. They must realize that flying can make them tired—especially in rough air—and they must know how to take proper precautions. Tests have shown repeatedly that if pilots understand that they are fatigued they can call on their reserves when they need to.

A perfect example of what happens to pilots when they are tired showed up in studies of fatigue conducted by the British during the war. They tested 140 pilots in a standard *Spitfire* cockpit arranged something like a Link trainer. Automatic records were taken of the deviations from course in terms of side-slip, airspeed, and errors in altitude and compass reckonings.

Each pilot was tested during a two-hour session which had seven periods of intensive flying activity, interspersed with three periods of level flying. The test was rugged, and physical and psychological checks of the pilots after it was over showed them to be extremely fatigued.

In those two hours, the average pilot showed a deterioration in sideslip accuracy and airspeed of 45 to 50 per cent. Records for flying altitude and compass courses improved (*Continued on page* 51)



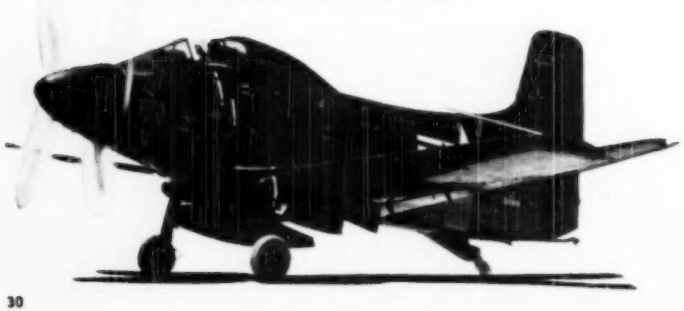
Search for high-speed prop led United Aircraft engineers to investigate weird shapes: (A) starting point was World War II prop. (B) an attempt to relieve compressibility effects at blade mid-section was unsuccessful. (C and D) tests proved sweepback in props was unsuitable. (E) the solution: square-tipped hollow steel blade that maintains as high as 80 per cent efficiency at 600 m.p.h. Stubby designs proved inefficient (F) even when sweepback was incorporated (G).

PROPS GO SUPERSONIC

By GIL CLOSE

Revolutionary turboprop engines may soon drive military planes faster than the speed of sound.

Lethal-looking Douglas Skyshark (A2D) is driven by six-bladed contra-rotating props hitched to a 5,500-h.p. Allison T-40 engine. It is in 500-m.p.h. class.



THE KOREAN WAR has shown that propeller-driven fighters have one enormous advantage over jets—time over target. While F-80's based in Korea are limited to minutes over the target, the propeller-driven *Mustangs* can stooge around for 5½ hours waiting to be called in for ground or air support activities.

But the *Mustangs* have another problem. As this was written they had not met jet fighter opposition but if they did it was generally conceded that they could no longer live in the air.

This is one of the primary dilemmas of support airplanes today and it is being met by a revolutionary new development—putting propellers on the jets.

Until recently our scientists believed that the day of the propeller-driven fighter was past. The U. S. Air Forces have not ordered a new propeller-driven fighter since the end of World War II, and the Navy has only one fighter in production—the rugged *Corsair*. All attention has been turned to jets because they can knock down anything else in the air.

But now all this is being changed with the discovery that new propeller designs permit the gas turbines to make efficient use of their enormous power. Turboprops are already powering at least one high speed U. S. Navy plane (the experimental Douglas A2D) well over 500 m.p.h. and it is confidently expected that they will be propelling planes faster than sound in less than two years.

When this happens such dilemmas as that of our jets in Korea (see October FLYING) will cease to exist. The new supersonic propeller-driven fighters will be able to stooge economically around the battlefield—yet still meet jet fighter opposition when it comes.

The big barrier to faster propeller-driven airplanes has been dat ol' debbil compressibility. Even for fighters flying far below the speed of sound, the propeller tips often reached or exceeded sonic speeds. Air piled up around the propeller tips, causing enormous drag. If more power was added, shock waves wrecked the propellers.

The same problem existed when conventional wings were tried at supersonic speeds. Then engineers found that if wings were thinner, and swept back, they could penetrate the sonic barrier. The same solution has been applied to propellers.

Extremely thin blades, swept back, have been tested. They have worked well, too, but it has been found difficult to obtain sufficient strength with the sweptback blades because of their shape. Accordingly, engineers have had to compromise on thinness alone. Hamilton Standard has already tested such blades in a wind tunnel at speeds equivalent to 700 m.p.h. at sea level. The blades must be super strong, thin, very wide. They are difficult to engineer, but they are being engineered. Other problems include those of gearing, and of developing even more powerful engines to back up the new design.

A noteworthy start has been made in the new Douglas A2D (*Skyshark*) powered by an Allison T-40 gas turbine engine of 5,500 h.p. The T-40 drives a six-bladed Aeroproducts contra-rotating propeller. The *Skyshark* is a big airplane, with a 50-foot span. Its performance is restricted but top speed is believed to be around 550 m.p.h. That's not much below the top speed of a good many jet fighters, and the *Skyshark*, besides being not a fighter but an attack bomber, is just a start in this supersonic prop derby. (*Continued on page 57*)

The Cub AND THE Chinese Kite

By H. L. Richardson

At the time of this incident, author was Chief Engineer for Civil Air Transport in China. He holds single- and multi-engine ratings and has logged 2,146 hours since 1935. Richardson now owns a Ryan Navion and lives in Tucson, Ariz., with his family.

IT WAS late one dreary, grey afternoon in 1947 when Ken Buchanan (an ex-major in the ATC) and I were sitting around his office at Hungjao Aerodrome about six miles outside of Shanghai. Ken was then chief pilot of General Chennault's newly-formed Civil Air Transport, then known as CNRRA Air Transport. The airline had been in operation only a short time and was struggling to cope with the vagaries of Chinese weather at an unseasonable time of the year.

Ken and I were discussing pilot proficiency, and there was a point of discussion as to whether his lightplane touch had remained the same, even though he had been flying multi-engined planes for the past few years. Ken said a pilot did not lose his touch as long as he maintained his flying proficiency. I disagreed.

It so happened that one of our Policy Board Members (Board of Directors), Mr. L. K. Taylor, had managed to import a brand new J-3 *Cub*. It will always remain a mystery how Mr. Taylor managed to convince the Chinese Air Force, which largely controls the import of aircraft, that the *Cub* was not a lethal weapon intended to be used for the dropping of atom bombs. But at any rate he managed to get it into China. I am certain that Taylor is the only private person ever to have had his own plane in the history of Chinese aviation—that is, outside of Generalissimo Chiang Kai Chek.

Since the *Cub* was parked outside, we decided to settle the argument by going up.

Ken got up front and I climbed in the rear since I had been flying the *Cub* a great deal—demonstrating it to interested Chinese organizations. We took off between four and five o'clock in the afternoon with fairly good visibility, little or no horizon, and a dark grey overcast. (*Continued on page 42*)

"It looked hopeless. There we were, riding down that damn rope like a little tin monkey on a string . . ."

For these pilots, the thin thread between life and death was fastened to a kite.

Ted Nelson, right, talks to author.

FLYING A *Powered Glider*

By WILLIAM G. BRIEGLEB
President, Briegleb Aircraft Company

Glider engine ends towing expense, adds to soaring fun, brings plane back home.

OVER the Mojave desert, I was caught with my thermals down. We were soaring at 7,600 feet above sea level, but the altimeter swung slowly down to 5,000 . . . 4,000 . . . 3,200.

I turned to my father-in-law, who is 72 and who was taking his first flight in a glider. "Like to walk back?" I asked. Ordinarily, a couple of gliding enthusiasts could have looked forward to a long hike back to base—or a long wait for transportation.

But Dad just laughed. He watched me turn on a gas valve located behind my head. Then, reaching under the dash panel, I gave two sharp tugs on the starter cord, turned on the ignition switch, and gave the starter one more tug. The little 26-h.p engine of the Nelson *Dragonfly* leaped into action.

Back over our base at El Mirage, I cut off the fuel and ignition and played in a dust-devil until I saw that Dad was fully at ease. Then I started our landing pattern and lined up on the final leg.

"Aren't you going to start the engine?" Dad asked.

"Nope," I replied. "I've never been able to get you into a glider until we got this one with power—and I want you to get as much of the real thrill of soaring as possible."

Dad sat quietly a moment, then said: "Well, what's that engine for, son, if you don't use it?"

"It's just for taking-off, finding a thermal—and for use in emergencies, like we just did," I answered.

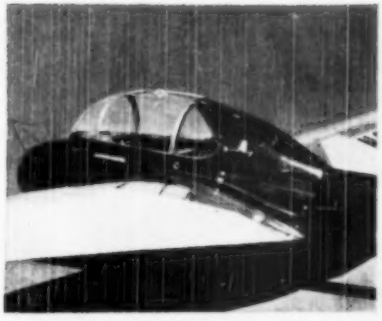
As the wheels touched the runway, we went through the same process of turning on the gas, priming, switching on the ignition and starting the little engine. Then we taxied to the tiedown area.

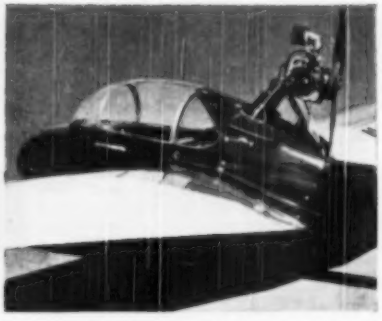
We had been up 45 minutes, had soared to above 7,500 feet, and had consumed two quarts of fuel!

The powered glider isn't a new invention. Back in the early 1930's the Germans attached small motorcycle engines to gliders to enable pilots to take off without assistance. Wolf Hirth, noted German sailplane designer, developed his own 25-h.p. engine as a powerplant for several *Baby Graneau* sailplanes. Some years later one of these gliders crossed the English Channel to Lon- (*Continued on page* 57)

The Hummingbird fits snugly on its trailer and can be put together by two persons in 20 minutes.

The Hummingbird climbs 275 f.p.m. with a 40 h.p. engine, its metal wings span 54 feet, its 22-foot fuselage is moulded mahogany veneer. It cruises at 60 m.p.h.





Glider is streamlined for power-off flight by retracting engine. Tricycle gear is also retractable. A full-vision canopy of Plexiglas encloses the two-place cockpit. It will sell for $5,000 to $7,000.

Aeronautical Charts

RIGHT AFTER the first World War, pilots weren't bothered too much by navigation. When they needed a map, they picked up the best road guide they could find—and flew along trying to match highways with lines on the crude charts.

Today, the reverse is true. The U. S. Government has printed so many charts, maps, planning aids and aerial guides that many pilots can't keep up with them. Yet for accurate navigation, it's a good idea to know what types of charts are available, where you can get them, and how much they cost.

This list, compiled by John Jefferson and checked by Government agencies, contains the latest information on navigation charts published by official agencies. Pilots can clip this page from FLYING—or, for more detailed information, can write for the comprehensive "Aeronautical Chart Catalog," U. S. Coast and Geodetic Survey, Washington 25, D. C.

☆ ☆ ☆

DEPARTMENT OF COMMERCE
(Coast & Geodetic Survey)

The following charts are sold by authorized agents, district offices and the Washington office of the Coast & Geodetic Survey, Washington 25, D. C. Remittances should be sent with each order. A discount of 33⅓ per cent is allowed on gross chart orders of $10 or more.

Aeronautical charts of the U. S. and Alaska are issued in the following series:

Sectional. Scale: 1:500,000. New issues have omni and VHF information in dark blue, and have practical information on reverse side of chart. 25 cents each.

World Aeronautical. Scale: 1:1,000,000. 43 of U. S. and 15 of Alaska. 25 cents each.

Local Aeronautical Charts. Scale: 1:250,000. 18 charts covering metropolitan areas of the U. S. 25 cents each.

Instrument Approach, Landing Charts. Scale of approach chart: 1:250,000; landing chart: 1:31,680. Series covers principal airfields of the U. S. 5 cents each. These are available on annual subscription basis at $20 per year.

Instrument Landing System Charts. Covers principal air terminals in the U. S. with ILS. 5 cents each. These are available on annual subscription basis at $6 per year.

Radio Facility Charts. 65 covering the U. S. and 14 covering Alaska. 5 cents each. One year subscription in U. S., $4.50. In Alaska, $1.50.

Airport Obstruction Plans. Series will include 550 plans when completed. Shows obstructions protruding above a 40-to-1 glide angle from the end of runways—and also shows all runway profiles. 40 cents each.

Direction Finding Charts. Scale: 1:2,000,000. Six cover the U. S., three cover Alaska. 40 cents each.

Planning Charts. Scale: 1:5,000,000. Chart AP-9 for the U. S. Chart 3069a covers Alaska. 40 cents each.

Aircraft Position Charts. Scale 1:5,000,000. Charts 3071, 3072 and 3073 designed for overseas long-range air navigation operations by U. S. commercial air carriers. 10 cents each.

Route Charts. Scale: 1:2,000,000, on an oblique Mercator projection. One from Chicago to Gander. Seven for U. S. 25 cents.

Auxiliary Charts. Various scales. Provide special aeronautical information. Prices vary from 10 cents to $1.

The following armed services charts are distributed by the Coast & Geodetic Survey:

World Planning Charts. Scale: 1:500,000. Partial coverage. 43 charts cover the entire world. 40 cents each.

Long Range Air Navigation Charts. Scale: 1:3,000,000. 78 in series. 40 cents each.

World Aeronautical Charts. Approximately 900 charts have been compiled. Cover all land areas of the world. Scale: 1:1,000,000. 25 cents each.

Flight Charts. Scale: 1:1,000,000. Cover principal airways of the world. 25 cents each.

Pilotage Charts of Alaska. Scale: 1:5,000,000. 25 cents each.

Special Charts (various scales). Cover selected world areas. 40 cents each.

Pilot's Handbooks. Also separate charts from books. For special foreign operational areas. Handbooks $5 each plus $1 for cover. Separate charts 5 cents each. One year revision service, $5 additional.

V-30 Naval Aviation Charts. 30 nautical miles to one inch. 104 charts in the series. 50 cents each.

V-70 Naval Aviation Charts. 70 nautical miles to one inch. 17 charts in series. 50 cents each.

DEPARTMENT OF THE NAVY
(Hydrographic Office)

Track Chart of the World. V-1262 (30"x 50") 60 cents.

Outline Chart of the World. V-1262e. (30"x50"). In color. $1.

Air Facilities Chart Designed for Planning. VS-1. Western Pacific. Spot elevation. Land areas tinted. Aircraft facilities. 30 cents.

Air Facilities. VS-2. Pacific area. 20 cents.

Distance Chart. VS-3. Airline distances of the Pacific ocean. 10 cents.

CAB PUBLICATIONS SECTION

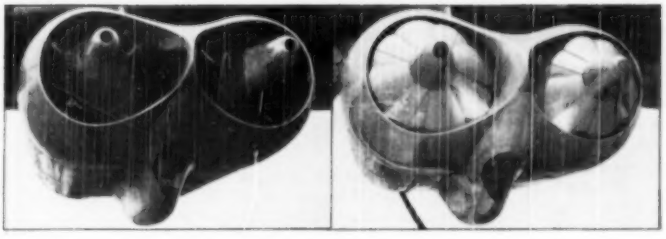
International Air Routes of United States Carriers. Issued semi-annually. (11"x17").

Territorial Air Routes of U. S. Carriers. (11"x17").

United States Air Transportation System. Limited-Period and Pick-up Routes Certificated. (Map 11"x17"). Issued semi-annually.

HAVE YOU SEEN?

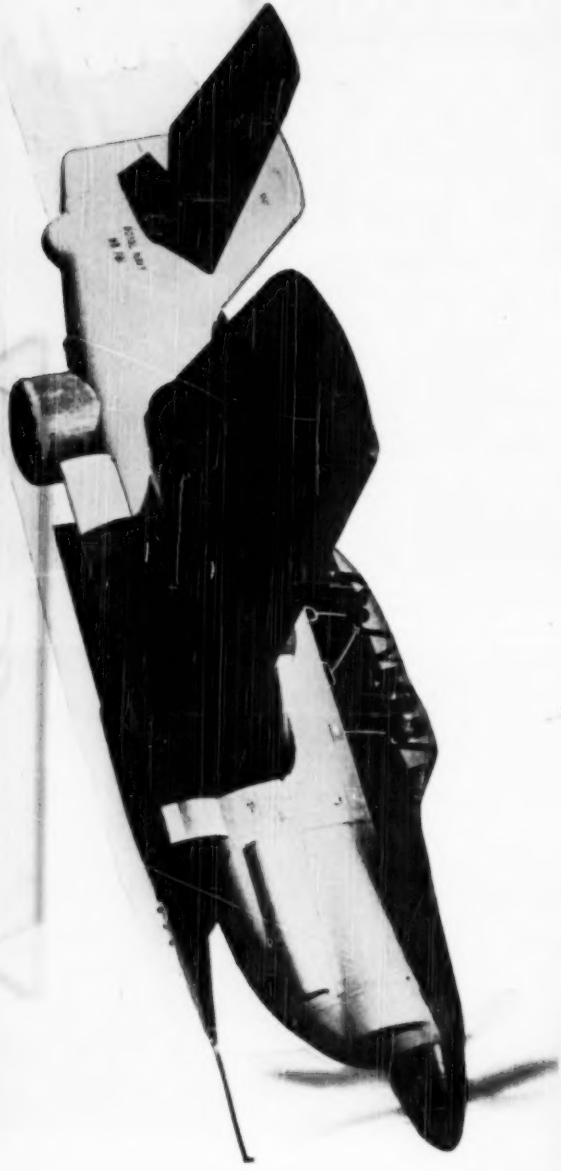
Beechcraft YT-34 is USAF version of Model 45 (Mentor) which was developed from the Bonanza. Two have been delivered to Air Force, are being flown against Fairchild T-31 and Temco YT-35 (Buckaroo) in service competition. Winner will be new basic trainer. ▲



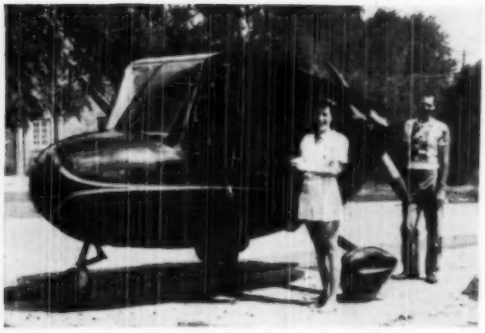
Production Model B-36D bomber makes first take-off equipped with four J-47 jet engines in addition to the regular six 3,500-h.p. piston engines. Close-up of jet installation (left) shows "doors" which cover jet air intakes when plane is on ground or cruising on its piston engines alone. On ground they keep out foreign objects; in flight they cut down drag considerably.

HAVE YOU SEEN?

Continued



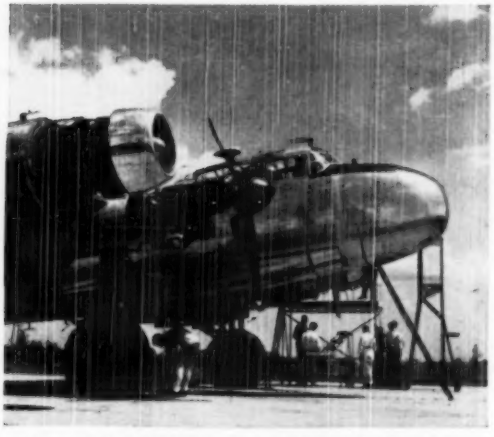
New British Y.A.5 is Naval bomber with deep fuselage, wide bomb doors. Submarine detector aft of bomb bay doors is radar device in retractable housing. The craft is carrier-based.



Roadable unit of plane designed by Bruce K. Hallock, Austin, Tex., is powered with 145-h.p. Continental engine with extra cooling arrangements. Unit has been tested at 60 m.p.h. Finished machine would be tailless pusher with folding wings.

Home-Built Helicopter

EXEL Model 100 was built by George Exel in rear of filling station he operates at Boonton, N. J. Called EXEL-i-copter, it is powered by 100-h.p. Franklin engine. War surplus Platt-LePage rotors and 28 parts from 12 makes of automobiles are included in its construction. Wood rotor was hand-carved. Exel has been building aircraft for 40 years, and taught himself to fly. Work is progressing on certification.

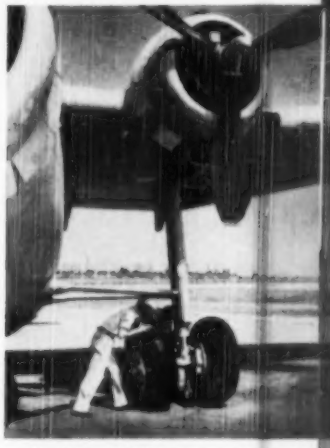


Converted Lancaster bomber is being used by Avro Canada as flying test bed for powerful Orenda turbojet engine. The Orenda is being installed in big CF-100 night fighters.

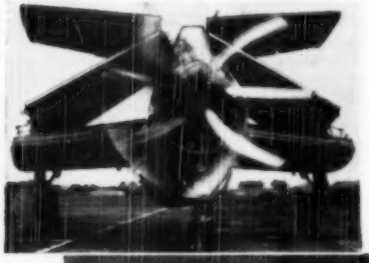
Aero Commander was certificated by CAA on June 30 and recently demonstrated to armed services as utility transport.

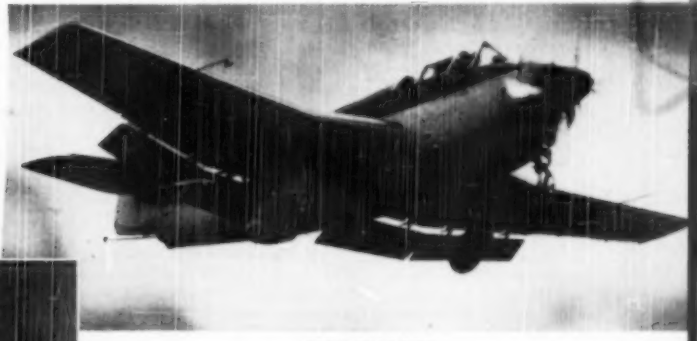
Fairchild XC-120 (Pack Plane), first military transport with detachable fuselage, was aloft 45 minutes on its first flight.

First production Boeing B-47A (Stratojet) flies at Wichita. Plane is equipped with six GE J-47 turbojets, has maximum gross take-off weight of 185,000 pounds, carries over 10 tons of bombs.



Northrop C-125 has a second set of wheels for operating on soft runways.





SUB CHASER

New British Fairey 17 is anti-submarine plane with unusual characteristics. Upper left, note double fold in wing for compact storage aboard carriers. Left, note configuration of plane, with radar housing extended. Above, plane has big flaps extended, and radar housing is retracted. Plane is powered by an Armstrong-Siddeley Double Mamba engine with twin turbines driving contra-rotating props.

Author, now a Washington magazine correspondent, was a Marine liaison pilot during World War II. He has logged over 800 hours, most of them in OY-1's.

I Learned About Flying From That! NO. 132

By SEABROOK HULL

The lightplane's gas was low, the weather was ceiling zero, and the pilot overshot Hawaii!

IT STARTED out as a routine flight, the regularly scheduled two-plane mail run down to the Naval Air Station at Hilo, the only full-sized air base on the island of Hawaii. Our squadron, VMO-5 attached to the 5th Marine Division, was based at Kamuela, headquarters town of the famed Parker ranch—and just 40 miles overland or 75 miles via the coastline from Hilo. This was in the fall of 1944, a few months before we invaded Iwo Jima.

Our landing strip nestled neatly in the 2,600-foot saddle between Mauna Kea, a 14,000-foot extinct volcano to the southeast, and a 5,000-foot ridge to the northwest. We were flying OY-1's, or L-5's as the Army called them.

Weather at the strip was brilliantly clear but, as usual, the clouds banked up in a vertical wall not 500 feet off the east end of the runway. It was that way five days out of every week. Sometimes the clouds towered 10,000 feet or more, sometimes only 500 feet. Today it was close to the two-mile mark. It meant the overland route to Hilo was out for contact flight. We decided to fly along the coast rather than waste time climbing over the top. Each plane carried an aircrewman as passenger.

We checked the weather at Hilo—it was raining but open—and were airborne by 3:30 p.m.

Except for a few rain squalls, the trip to Hilo was uneventful. We landed a little after four o'clock, running at nearly full throttle all the way.

We were set for the return flight about a half an hour later. It had stopped raining, but low black clouds still hung over the base. To the northwest, however, along the coast route, we could see sunlight and blue sky above. We decided to return over the top. The cloud bank on this side rose gradually and would make an easy climb.

Without taking time out to refuel or check the weather back at Kamuela, we took off immediately.

Clearing Hilo and the murky weather, we turned inland and started climbing. The green sugar cane fields that line Hawaii's northwest slope soon faded into a thickening stratus layer that hugged the ground in a dense fog. The great rolls of puffy white clouds rose ahead of us.

A little ahead and to our left was Mauna Kea. When it stood to our rear at about the same angle, we would be over our strip and clear of the clouds, or so we planned. That was to be the extent of our navigating, contact procedure, when actually our only contact with the ground was the mountain. It seemed enough at the time.

By the time we had reached the "top" of the cloud bank our altitude read 10,000 feet, and we were still climbing gradually. Mauna Kea now stood off our left wing-tip. Pretty soon Mauna Loa was visible further to the south; then Puu Hualalai, an 8,000-footer close to Hawaii's Kona coast, hove into view. We were expecting them and noted them casually.

The air was calm and brilliantly clear. That great white sea of softly rolling crests and troughs was an open invitation to practice low-level contour flying, though with none of the dangers that go along with ground-level flat-hatting.

(*Continued on page 56*)

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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

CIVIL AIR DEFENSE

How to best utilize civil flying in the event of an emergency was the subject of a plan recently drawn up by the Emergency Aviation Council, a group composed of 12 prominent representatives of the aviation industry. J. B. Hartranft, Jr., AOPA's general manager, participated in the discussions which resulted in a plan entitled "America's Civil Air Power" submitted to CAA Administrator Rentzel.

The committee report includes a detailed inventory of the equipment and personnel resources of the industry, an outline of proposed security measures to be undertaken in the interest of national defense, and recommendations for use of civil aircraft during the present partial mobilization as well as in a time of crisis.

Prior Government plans on the mobilization of civilian flying had been directed largely toward restriction or grounding of private flight. Committee members hoped the report would point the way to greater utilization of private flying in an emergency.

Committee members were George E. Haddaway (AOPA 62899) chairman, J. B. Hartranft, Jr., Maxwell W. Balfour, Lynn L. Bollinger (AOPA 57323), H. L. Casebeer (AOPA 8441), Leighton Collins (AOPA 3000), Arthur Godfrey (AOPA 4492), W. O. Marsh, James D. Ramsey, C. J. Reese (AOPA 39337), E. B. Williamson (AOPA 650), and Harold F. Wood (AOPA 63992).

PAUL BUNYAN DAY

AOPA members of the AOPA Fort Bragg, Calif., unit recently helped the city celebrate Paul Bunyan day with a special AOPA float. Preparations weeks in advance included beard growing, costume planning and building the float. AOPA unit members—including K. P. Nicolos, John Denevi, Ed Fereira, Frank Bednar, Helen Nicolos and Norman Soeth—felt the effort well worth it when their float entry won a $75 prize.

PARLAY BONUS AWARD

The first big bonus prize in the AOPA Pilot Parlay contest has been awarded to Helen Burkhart (AOPA 65364), Montoursville, Pa., for the 500th membership application submitted in the AOPA contest. The 500th new member is Wilbur Hain (AOPA 73693) Montgomery, Pa. The sponsor and the member were each awarded the first bonus prize of a handsome Sheaffer Desk Pen Set personalized with their names, AOPA wings, and AOPA number engraved on the set stand. The second bonus prize will be awarded to the old member bringing in the 1000th new member in the parlay.

All AOPA members are eligible to enter the contest. All new memberships must be submitted on special parlay application blanks which can be obtained from national headquarters. When the first five new memberships have been submitted, you are awarded the first prize of an AOPA Zippo lighter. We'll send you more parlay forms and with each additional five memberships you get additional prizes. After you've turned in 25 memberships and received all five "first race" prizes, you're ready for the "second race." More prizes, of greater value, will be awarded for "second race" contestants.

COMPENSATION

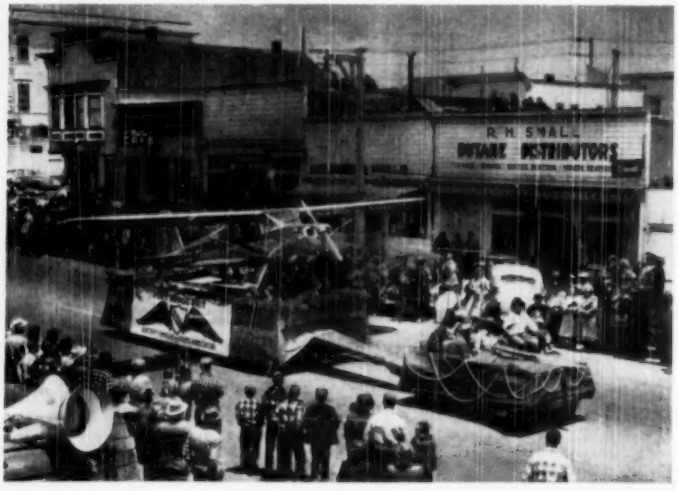
One of our members sometime ago brought to our attention a problem of high premiums for Workmen's Compensation on executive or part-time pilots. To date, AOPA has not been able to do a great deal about it.

However, if every AOPA member who is employed under circumstances providing for Workmen's Compensation and who flies occasionally would contact us, it would help. AOPA would like to know if you are covered, if lack of coverage prevents you from being able to fly occasionally on the job, and generally what problems you have encountered along these lines.

AOPA FLYING HAMS

Some time ago AOPA members who were amateur radio operators were asked to send their names and call letters in to national headquarters. Those AOPA members who responded are listed below:

Name	AOPA No.	City, State	Call Letters
Kenneth Richter	49355	Elkins Park, Pa.	W3ETM
Charles C. Wysall	11193	Marion, O.	W8TV
Leon A. Faber	53044	Sandwich, Ill.	W9EH
Jean L. Auxier	8870	Pikeville, Ky.	W4NVR
Frank M. Allen	63229	Denver, Colo.	WØOAD
Kay Paddock	47138	Los Angeles, Calif.	W6NL
F. L. Gammill	38523	Salinas, Calif.	W6GSQ
Erma D. Green	40458	Tampa, Fla.	W4KGF
R. G. Kimball	64616	So. Waterford, Me.	W1ØFK
J. A. McGregor	60625	Verona, N. J.	W2RJM
Paul Crowell	13597	Springfield, O.	W8WXG
R. R. Rosenkrans	53744	Waterloo, Ia.	WØMG
L. D. Branom	63197	Casper, Wyo.	W7AMU
Michael Stalmach	33269	Detroit, Mich.	W8YFY
R. H. Kazmierski	66828	Coudersport, Pa.	W3WFK
D. A. Miller	29010	East Hampton, N.Y.	W2MQR
Herbert E. Parmeter	58181	Mayville, N.D.	WØCGM
V. W. Hodge	14597	Claremont, N.H.	W1ATJ
O. P. Holesonsky	13164	Brainard, Neb.	WØLEF
S. T. Cone	59256	Jackson, Miss.	W5JIP
Tom Keenan	12782	Great Falls, Mont.	W7LBD
John D. Holtmberk	54180	Sandwich, Ill.	W9KZO
R. C. Humphrey	711	Brookville, Pa.	W3PHG
R. O. Barney	60563	Shreveport, La.	W5ISP
Robert M. Ellis	45179	Indianapolis, Ind.	W9YSA
Jack Dale	61792	State College, Pa.	W3VPH
Ronald Bryant	25406	Columbus, O.	W8KVV
George M. Rosen	68109	N. Tarrytown, N.Y.	W2CVV
J. T. McHughes, Jr.	55436	Shreveport, La.	W5PUX
J. H. VanArtsdalen	439	Jacobus, Pa.	W3AXA
Lt. W. R. Phillips, U.S.N.	64247	Boston, Mass.	W4JMB
George E. Mayer	46708	St. Croix, V.I.	KV4AO
Alvin D. Sisk	24754	New York, N.Y.	W4NEY
Erik Brorup	63954	Lyngby, Denmark	OZ7EB



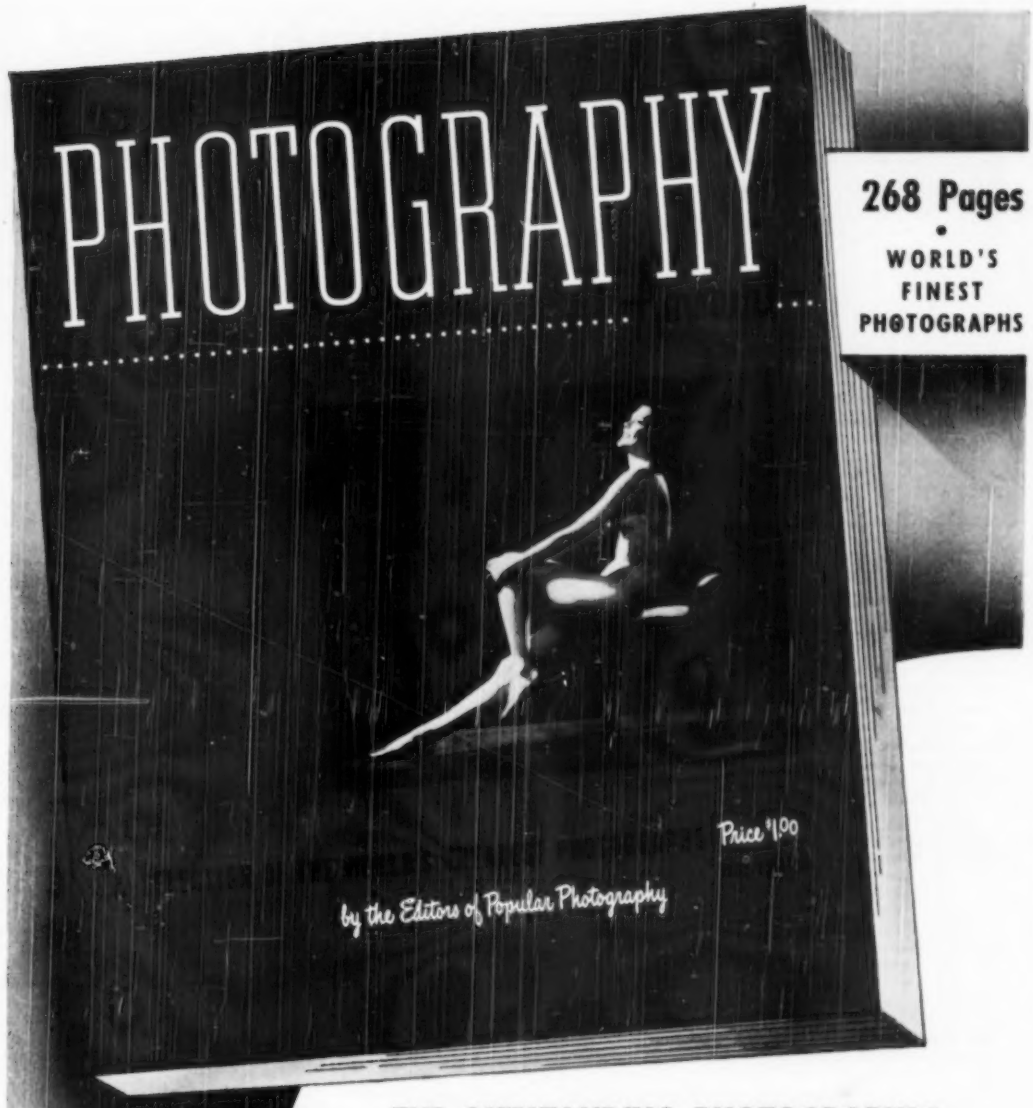
Aviation float entered by Fort Bragg, Calif., AOPA Unit in annual Paul Bunyan Day parade won a $75 prize. The float featured a Cessna mounted on a decorated lumber cart.

SKY WRITER

Inquiries from AOPA members to national headquarters come in all varieties. One recently asked us if any company held a monopoly on skywriting. The AOPA'er wanted to avoid difficulties if he went into the skywriting business himself. AOPA checked around and promptly advised the member that no one company held a monopoly on sky writing. The member said this one service was well worth the cost of his yearly membership.

Another query asked AOPA for help in getting the AOPA member a citizenship waiver so that he could complete his pilot's training, which he had started before his final citizenship papers came through.

AOPA helped him file a petition with the CAB for a waiver of the citizenship requirements. The waiver was granted recently and our member continued his flight instruction.



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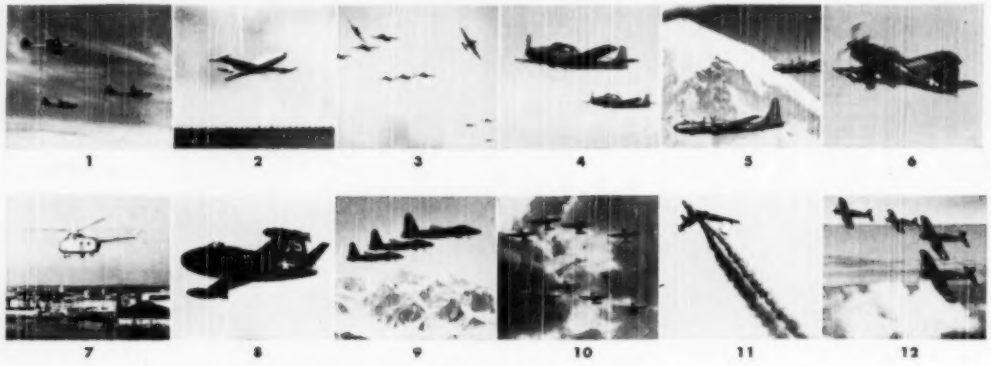

(1) Boeing B-29 Superfortress, (2) Republic F-84 Thunderjet, (3) Douglas C-47 Skytrain, (4) Ryan L-17 Navion, (5) Boeing B-50 Superfortress, (6) Martin AM-1 Mauler, (7) Sikorsky H-19, (8) North American FJ-1 Fury, (9) Lockheed P2V Neptune, (10) Republic F-84 Thunderbolt, (11) Boeing B-47 Stratojet, (12) Chance Vought F4U Corsair.

The Chinese Kite

(Continued from page 31)

Typical of a multi-engine pilot, Ken got her tail in the air and beat his way down the runway—apparently trying to build it up to "single-engine" flying speed. I can understand how he felt, because any time an airspeed indicator in a multi-engine plane gets below 100 m.p.h., it is time to do something about it, and this little old *Cub* had to strain to make 75. Naturally I couldn't resist giving Ken the "I told you so" routine.

Well, at any rate, Ken went on around, making a wide elliptical pattern, and finally got squared off for his final approach about four miles from the end of the runway. We came dragging in with the typical transport approach over the tree-tops one-quarter of a mile from the end of the runway. He cut power just after the wheels touched down. I had a big laugh out of that and told him that I was sure that no CAA inspector in the States would come within a mile of giving him a certificate of any sort. Actually, Ken was more of a pilot than I ever hope to be, but it did provide me with a fiend's opportunity to razz him.

Then, seriously, I said that I would like to take the plane around the field and give him one regulation CAA single-engine pattern. We swung the *Cub* around, checked pattern for any incoming C-46's and then took off.

At 400 feet we leveled off, made our first turn across wind, and started to climb to 500 feet. Suddenly I saw what appeared to be a coarse, thick piece of black string running vertically through the center of the windshield. Ken leaned back and shouted, "What in hell is that?" I leaned up to answer, and then took another good look. Without answering, I rolled the *Cub* up on its left wing in a tight vertical bank.

I remembered that in the early months of the Chinese spring season, the villagers fly huge kites that take several persons to launch. Some are built on the principle of venetian blinds and are the size of a *Cub* or larger. It is customary for the various little villages, which are actually a small group of 10 to 20 houses scattered over the farmlands, to have competitions during this kite festival season with merits based on the size of the kite and altitude flown—plus evil spirits lured away.

It was not at all uncommon to see these huge kites flying at an altitude of 1,000 feet and even as high as 2,400 to 2,500 feet.

At any rate I realized that the little village off to the left on the end of the runway had a kite up somewhere above us, and this string across the windshield was actually a good size rope directly in our flight pattern and dead ahead.

By this time we were at 500 feet. It looked as though we were going to miss the kite rope, but in the second and a half it took to reach it, the darn thing grew to a diameter of one's middle finger. We hit it with a mushy impact that slowed us down almost to a stall. The rope cut into our leading edge about 4½ feet from the wing tip. The airspeed dropped to about 45 m.p.h. I applied full throttle, confident that it would break the rope.

But the only thing that seemed to move was the airspeed—which went down to 40 m.p.h. Involuntarily I pushed the nose down to gain airspeed. By this time there was a very audible zzzzzz-ing sound throughout the plane's structure. I looked out and saw that the rope had slashed back from the leading edge to the spar and outwards towards the wing tip another foot.

In less time than it takes to tell, I made an upwind turn and we were sliding down that infernal rope, which was zzzzing even more ominously against the front spar.

We both looked down the rope and saw that it was tied to a large tree firmly anchored in the frozen Hungjao muck. There were quite a number of people standing around the tree, and I could visualize the local magistrate sporting the gold wrist watch given me by my wife for our "last" wedding anniversary.

It looked hopeless. There we were, riding down that damned rope like a little tin monkey on a string.

Then for a few moments the rope from the wing down appeared to be vertical to the ground and we turned as sharply as possible. That did it! The drag of the kite, now pulling forward, pulled the rope out of the leading edge. The *Cub* started to drop for a moment, then picked up speed. We were finally able to level out at about 100 feet. Aside from some fluttering fabric and a couple of loose false ribs, the plane didn't appear to be damaged. I throttled back to 60 m.p.h. because I wasn't at all sure that the wing tip might not fold. I painted the *Cub* onto the runway with something less than 95 bounces and taxied slowly and carefully back to the revetment. When my shakes subsided, we got out of the airplane and looked at the wing. The rope had gone in at a vertical angle to the spar and then sliced outward toward the wingtip for almost a foot.

The next day there were urgent notices posted on the airline operations offices' bulletin boards advising pilots to beware of Chinese kites in the vicinities of airfields. One C-47 came into the field the following morning from Nanking, not having received the notam.

Our good friend in the C-47 clipped off the same type of rope that almost downed the *Cub*, but not before the rope had cut back some six inches into his leading edge.

Believe me, since then I have lost all interest in formation flying with flying discs, buzzards, or evil spirits departing from rural Chinese communities. END

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CIVIL AIR PATROL

WING TALK

CAP to Join OCD

PENDING ANNOUNCEMENT of a national policy for civil defense by the National Security Resources Board and the issuance of detailed directives by CAP national headquarters, all wings have been directed by General Beau to consider and undertake preliminary preparations for what is expected to be an important assignment in the nationwide civil defense program. The duties of CAP as an air arm of the Office of Civilian Defense will have to be "spelled out in more detail so that the mission of CAP as outlined by USAF, and that outlined by OCD will not conflict," CAP officials point out.

In the meantime, Wing commanders have been told to:

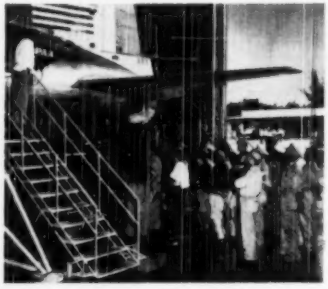
- Appoint or have appointed to all wing staffs a civilian defense coordinator. Also, consider assigning this position to officers at the group and squadron levels in areas where large populations make it necessary to maintain close liaison with mayors, city managers or councilmen.
- Contact the governor and advise him that a special CAP coordinator is available for consultation on civil defense problems.
- Review existing CAP or state emergency plans so that they may be kept current with new instructions from national headquarters.
- Brief all CAP public information officers on existing civilian defense plans and the role that CAP is expected to play in the nationwide program. An active public information program is necessary, say CAP leaders, to prevent the setting up of so-called emergency organizations by "well-meaning, conscientious, civic-minded individuals" that might duplicate functions which CAP is already organized to handle and which ultimately it will be called upon to assume.

Wing leaders were also advised that future training programs may include such subjects as radiological defense, chemical defense and evacuation.

Mayor Taylor Glass of Austin, Tex., pays annual CAP dues to Col. D. Harold Byrd, Vice Chairman of the CAP board.

Find "Lost" Aircraft

WISCONSIN WING flyers recently gave their AF air rescue instructors a professional demonstration of how well they know their search and rescue business. They spotted a "lost" aircraft hidden in a woods some 20 miles from Milwaukee, 35 minutes after an air search was started. And within 30 minutes after Lieut. Robert Jackson of the Kenosha squadron had sighted the downed aircraft, ground mobile units dispatched from Milwaukee's Mitchel Field were on the scene. More than 300 CAP airmen took part in the training exercise which was supervised by USAF's Fifth Air Search and Rescue Unit.



Portuguese air cadets study Pan American Clipper maintenance as guests of Florida CAP at Miami, during U. S. tour.

Hide and Seek in Texas

TEXAS WING flyers had themselves quite a time recently playing hide and seek with Texas National Guardsmen who were testing camouflage techniques. The guardsmen were so well hidden that one of their officers who knew where they were failed to spot them from the air. However, other sharp-eyed airmen managed to find them and score a couple of hits with flour sack bombs.

Test New Rescue Kit

A NEW RESCUE KIT rigging has been tested successfully by the Washington Wing. The new rigging, designed by Dr. A. J. Myers, a captain in the Yakima squadron, permits use of an ordinary parachute in dropping emergency rescue kits. Most kits require small parachutes.

New Texas Commander

A PROMINENT Dallas insurance man, Erwin J. Reeves, has been appointed commander of the Texas Wing and promoted to the rank of Colonel. A veteran airman, Colonel Reeves is also president of the Soaring Society of America and currently holds the national record for piloting a sailplane to a pre-determined destination—235 miles, from Grand Prairie, Tex., to Muskogee, Okla.

CAP's Film Story

CIVIL AIR PATROLLERS who have been trying to dream up new ways to acquaint their communities with the CAP's tremendous job as a full-fledged auxiliary of the U. S. Air Force will welcome *"CAP—Story of the Civil Air Patrol."* That's the title of the new two-reel documentary motion picture just completed for CAP and the Air Force by American Film Producers, Inc.

More than 250 copies of the film have been ordered and, as FLYING went to press, the word from Washington was that they would be available throughout the United States for public showing by November 1. Several copies of the film are to be available at each of the Headquarters of USAF's Air Materiel Areas. These are Mobile AMA, Brookley AFB, Ala.; Ogden AMA, Hill AFB, Ut.; San Antonio AMA, Kelly AFB, Tex.; Sacramento AMA, McClellan AFB, Calif.; San Bernardino AMA, Norton AFB, Calif.; Middletown AMA, Olmsted AFB, Penn.; Warner Robins AMA, Robins AFB, Ga.; and Oklahoma City AMA, Tinker AFB, Okla. Public information officers at all USAF air bases will also get a copy and some 50 additional copies are being distributed through CAP headquarters.

The new motion picture runs approximately 20 minutes and features the cadet program and covers all other CAP operations. The picture is cleared for commercial television showings, according to Don Baruch, Department of Defense motion picture advisor.

Principal "stars" of the picture are the members of Lieut. Col. Joseph F. Crowley's Group Nine, New York Wing, based at the Westchester County Airport, where all flying scenes were shot. Other scenes were filmed at Kearney, N. J., and at the University of Maryland.

Appoint New Press Officer

A CONVERT from the infantry, Capt. Shale L. Tulin is the new Public Information Officer at CAP National Headquarters. He replaces Maj. Freeman C. Bishop, who has left the service. A military government officer with the 99th Infantry during World War II, Captain Tulin transferred to the Air Force and prior to his CAP assignment was PIO for the 86th Fighter-Bomber Wing in Germany.

Aims To Be Jet Pilot

ALTHOUGH CADET EDWARD DUMAS of Shelby, N. C., is only 14, he's already made up his mind that his future job is going to be a "jet jockey, U. S. Air Force." And though some of his home town buddies still don't believe it, young Edward made up his mind to this while acquiring the distinction of being the youngest guy ever to ride an Air Force jet. Cadet Dumas earned his ride in an RF-80 (*Shooting Star*) by being one of the honor cadets at the CAP summer encampment at Shaw Air Force Base.

Anniversary Stamp?

HOW ABOUT a new air mail stamp to commemorate CAP's tenth birthday in 1951? That's the question asked by Maine Wing in its fine newspaper, *WING OVER*. And what's more, the boys from the Pine Tree State have a suggestion as to what it should look like—a three color stamp, they say, "bearing in the center a picture of the L-4, airborne, flanked by Senior and Cadet patches, surmounted by '1941 Civil Air Patrol 1951,' and, underneath, 'U. S. Air Force Auxiliary.'" Well, what do you think?

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LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

HIGH OCTANE

People think with words instead of with ideas. We tend to assign meanings to words even when we know better. One of the terms that is misused constantly now is "high octane," and no group of people abuse it more than the ones who know what it really means, or ought to know—the pilots.

We hear people remark or we read in the newspapers about the tank car catching on fire: "It was filled with high octane gasoline . . ." or "watch out for that stuff, it's high octane gas . . ." The implication is that if it's high octane it is more likely to catch on fire, to burn more fiercely, or to explode more easily.

Now, if you ask a pilot who makes such a statement just what the quality of high octane is, he will tell you that it is an anti-knock property, and the octane rating is a knock rating, and when a gasoline is high octane the flame propagation is slowed down so that it does not knock in an engine cylinder. In other words, it burns slower and does not catch on fire so readily, so that high compression will not easily begin ignition. Yet the same man will say, "The plane burned up awful fast, but of course it was full of high octane gas."

* * *

THOSE WAR DISPATCHES

Sadie is being influenced by the war jargon. She hears a lot of it around the flyers and, as she says, she is putting a good deal of it into useful use. The other night at a dance she made an orderly retirement to straighten her lines to previously selected positions.

* * *

MARTIAL PLAN

No one can say that civilization is not making progress. It used to be that the loser in a war paid the indemnity.

* * *

THE ANSWER

Last month we quoted this squib from the August *Reader's Digest:*

"When you toss a coin to decide who is going to pay the check, let your companion do the calling. 'Heads is called seven out of 10. The simple law of averages gives the man who listens a tremendous advantage.'"

Is this correct? Definitely not.

The principle behind such a problem as this is that on any toss you have an even chance of getting heads or of getting tails and, therefore, it makes no difference what your opponent calls.

Oh, so you're not convinced?

I could set down the formal mathematics. The usual thing for an author to do in a case like this is to set down the elaborate mathematics in order to show off his intelligence, but I shall not trouble you with that because I have found out that any man who tries to show off his intelligence is likely to show it up.

The problem is based on the thought—and I am going to convince you if it kills me—that in the long run you will throw half heads and half tails. Then, if your opponent has the habit of calling heads 70 per cent of the time, some people might think that that gives you an advantage, but it does not. It doesn't make any difference what he calls, whether his calls are themselves haphazard and so under the mathematics of probability, or whether they follow a definite pattern of one kind or another.

So it looks as though if he called heads 70 per cent of the time you would have the chances in your favor, does it? All right. Imagine that he goes all the way and calls every time, 100 per cent of the time, for heads. Since in the long run you throw half heads and half tails, you will lose half the time and win half the time. What he calls doesn't make the slightest difference. Unless, of course, he calls for a round of highballs.

* * *

THEY DON'T COUNT

The National Safety Council has announced that women don't crack up automobiles as often as men do. The Council was unfair, though. They counted the men drivers who were trying to get away.

* * *

THE GAS TURBINE

I suppose you read the article (August FLYING) about the Boeing gas turbine. It runs on hot air.

The Boeing people are going to have some trouble patenting the idea due to prior art. Congress has been using the principle for generations.

* * *

IT NEVER FAILS

One of the girls told Sadie that she couldn't possibly go shopping with her. "I'm going to my judo class," she explained.

"But why?" Sadie asked. "The bulges a girl needs certainly aren't muscles."

"Oh," the young lady replied, "I'm learning judo so I can take care of mashers. Why don't you join the class, too, Sadie?"

"I don't need to," Sadie answered. "Mother taught me to yawn."

* * *

EPITAPH

This piece of clay goes back to its Potter:
He put in gas, and with it some water.

The Navy Strikes

(*Continued from page 15*)

considers its beliefs about the mobility of carrier aviation and about alleged overemphasis by the Air Force on the heavy bomber program—at the expense of tactical and fighter support planes—have been vindicated in Korea.

The Navy today emerges like a stepchild at long last accepted into the family. There is even talk of reviving the controversial 65,000-ton carrier *United States.*

There is no question that President Truman's sudden reversal of Far Pacific policy, with his decision to go to the aid of the Republic of Korea, virtually caught the military with its pants down. There were a few Air Force planes in Japan but it soon became evident that the fuel-eating jets there found the trip to Korea almost unprofitable because it left them so little time over the target area. North American F-51's (*Mustangs*) were rushed from the United States and work was pushed day and night on Korean air strips. Meanwhile, an unnamed lieutenant came up with a make-shift extra fuel tank arrangement which, Gen. Hoyt S. Vandenberg, Air Force chief of staff, reported, greatly increased the time over the targets after flights from Japan.

The Navy, which claims it knows more about Pacific fighting than anyone else by virtue of its World War II experiences, cancelled the leisurely training cruise of the 27,000-ton carrier *Valley Forge.* And soon Carrier Division III, under command of peg-leg Rear Adm. John M. Hoskins, was working 15 daylight hours daily to hit everything in enemy-held areas from oil refineries to horse carts.

More carriers were rushed to the battle zone and the 27,000-ton *Bonor* made a record breaking eight-day trip from the West Coast to Japan with a record load of 150 Air Force planes—the F-51's.

But here are some examples of the evaluated results of the carrier aircraft during the first stages of the Korean operations which the Navy feels gives it a new lease on life:

1. A total of 716 combat and 431 patrol sorties during July, the first month of combat. Most of the missions were flown from the *Valley Forge.*

2. Without breaking their pace of attack for long, carrier planes protected the First Cavalry's amphibious landing at Pohang-dong.

3. Destruction of 26 enemy aircraft (all but two on the ground) during July. Another 13 were probably destroyed and 16 were damaged.

4. Three tanks, 39 locomotives, 11 large oil storage tanks, three power stations and four railroad bridges were included in the long and rather impressive "destroyed" report in July. It also included a 24-car ammunition and oil train.

5. The aircraft, raining everything from 1,000-pound bombs to *Tiny-Tim* rockets, ranged as far north as the enemy's capital at Pyongyang and to the southern port of Posu. A wide variety of targets was hit.

There was no question that the Navy

was inflicting heavy damage upon the enemy but the Navy took particular pride in several daring feats demonstrating low, pinpoint bombing tactics.

For example, Marine *Corsairs* attached to a carrier-borne close support group were reported in an 8th Army communique as having "repeatedly flown under the arc of enemy mortar fire" to wipe out 50-ton tanks. An Army briefing officer at the Pentagon commented that it was "quite an achievement."

Another official release reported that "one sharp-eyed Navy pilot noted a locomotive entering a tunnel . . . and lobbed his bomb in the tunnel entrance."

The Navy received the reports like long over-due dividends.

"All types of Navy aircraft are designed and built—and the Navy and Marine pilots are trained—around the dive-bombing technique of close support and pinpoint bombing. Korea has proven the effectiveness of that theory," a Navy air vice admiral said.

"And the situation in Korea also proved the Navy's contention that when something pops you've got to have the bases from which to strike back immediately.

"The carrier task force has an ability not possessed by any land air force: mobility. Its bases can readily be moved. Mobility gives it range. Korea has proven once again that the mobile base is what is needed to strike aggression anywhere —east, west, south or north."

Evaluating the reports of the effectiveness of the Navy and Marine Corps aircraft, the Navy high command said it showed that the service's techniques of training, flying and the use of the carrier were indispensable to national security.

It should be pointed out, of course, that neither Navy nor Air Force aircraft had encountered any facsimile of air opposition as this article went to press. Air Force generals called it a "phony air war" and contended that the reason the propeller-driven *Mustangs* were summoned was that the modern jets should be saved for the day when and if the Soviet decided to throw in some of its modern airpower. Neither had the Air Force used its giant B-36 bombardment planes.

But an Air Force briefing officer told of how B-29's (*Superfortresses*) were pressed into service as ground support planes—to the derisive cries of dyed-in-the-wool Marine veterans. Nevertheless, the fact that the B-29's were being used for such purposes showed the dire situation in which our troops found themselves before the onsurging Reds in July.

And it showed, too, that the Air Force had concentrated upon strategic bombing to such an extent as to be injurious to tactical aviation and the development of adequate fighter aircraft and fighter techniques, according to Navy partisans.

The Navy took pride in its small fast bombers and high performance fighters in Korea and moved swiftly to dispatch more to the scene to continue the destruction of such key strategic targets as bridges, canal locks, tunnels and transport equipment.

While enemy aircraft were absent from the Korean skies, neither was the Navy encountering anything other than the un-

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BETTY SKELTON'S NOTEBOOK

A THRILLER

The National Air Fair at Detroit turned out to be a real thriller . . . One of the midget race heats on the first day made even the old-time race pilots hold their breath. BILL BRENNAND of Oshkosh, Wis., flying Wittman's famous *Buster*, was off first and held the lead for several laps. Then BOB DOWNEY of Whittier, Calif., flying *Minnow*, moved up to within a few feet of Bill's wing tip and attempted to pass low and on the inside. Bill didn't expect anyone to pass on the inside and didn't know Downey was close until, rounding a pylon, he looked at *Buster's* shadow on the ground and saw that it had an extra set of wings.

From then on the fireworks really started . . . lap after lap they flew so close it was hard to tell whether there were one or two planes—at one point Downey had to go into a steep climb to avoid a collision. The hair-raising duel for the lead ended when both were disqualified for flying below the minimum altitude.

Bill has flown in more midget racing events since the war than any other pilot, won the Goodyear Races twice, and had a clean record of not a single violation or pylon cut against him in his entire career. There were two mighty long faces after that race . . .

GAL SKYWRITER

Women pilots interested in an aviation career would do well to follow the example of ELIZABETH PETTITT of Montclair, N. J. An ex-WASP with 900 hours, Elizabeth has been the nation's leading feminine skywriting pilot since 1947 and is now a combination skywriter-secretary for the head of an Indianapolis automobile agency.

One day while all her friends (including the boss) were watching her skywrite at 10,000 feet, Liz let her thoughts wander for a moment and started making an "R" instead of an "E." She tried hurriedly to doctor it up, but learned the hard way that there's no such thing as erasing that kind of writing. Took her months to live it down and, even now, she has to convince her friends that she really *can* spell . . .

AT LAST, AN INSTRUMENT CARD

Col. F. H. HARDING of Air Force Training Division in Washington, D. C., awarded me a blue instrument card with much ceremony (seems almost everyone in the Pentagon has one): THIS IS TO CERTIFY THAT BETTY SKELTON HAS NOT MET ANY OF THE REQUIREMENTS FOR THE INSTRUMENT PILOT CERTIFICATE AS PRESCRIBED BY AAF REGULATIONS. THEREFORE SHE IS ENTITLED TO FLY ONLY WHEN THE COLOR OF THE SKY MATCHES THE COLOR OF THIS CARD.

LOW-COST MIDGET

PAUL PRICE has created quite a bit of excitement around the Pontiac, Ill., airport with his experimental job, the *Price Special*, built with the help of the gang at the Pontiac airport.

Spex for the single-seat midget are: length 12 ft. 6 in., height 5 ft. 5 in., span 20 ft. 11 in., wing area 79 sq. ft. Take-off speed is 30 m.p.h., rate of climb 500 f.p.m., and cruising speed 70 m.p.h. The plane is powered by an Aeronca E113C engine and has a fuel capacity of 4.2 gallons.

Total weight of the *Special* is only 325 pounds. Cost? The amazingly small sum of just $1.25 per pound!

WORTH QUOTING

Two boys at the Oshkosh air show looked over the Wittman monoplane midgets on the line and then walked over to *Little Stinker*. After a moment's silence, one of them said confidently, "I know why she's got two wings instead of one like those others. If she loses one, then she's still got one left to finish all those stunts . . ."

Betty Skelton

identified periscopes of submarines. The *Valley Forge*—which had planes on their targets less than 24 hours after Admiral Hoskins started planning his mission in a Japanese port—passed through that unblinking scrutiny. But the Navy was taking no chances that the North Koreans yet might turn up with subs. It was operating carrier task forces protected by screens of smaller vessels.

One thing that kept the Navy from concentrating solely on the Korean targets was the fact that Mr. Truman also assigned it to patrol the seas between Formosa and Communist-held China.

The Navy found the small escort carriers particularly adaptable to the Korean operation. They furnished close air support within a matter of minutes after being summoned. Targets usually were furnished by an Air Force liaison pilot, flying over the front lines, who got his assignments from a radio jeep cruising as near the front as possible.

Navy pilots reported they liked the jets in the Korean operation because the added speed made them more difficult targets for antiaircraft fire and, too, that same speed would perhaps be needed when and if air opposition was encountered.

The carrier bases moved to within 70 to 75 miles of the Korean coastline and the Navy jets were not presented with the Air Force problems of getting back to air fields in Japan.

Officially, the Navy Department said "we are very well pleased" with the performance of the jets—which carry the same wallop as conventional propeller-driven types.

Representative Robeson, Democrat of Virginia, said the Navy planned to ask for a go-ahead on the huge $189,000,000 flush deck carrier *United States*—which Secretary of Defense Louis Johnson abruptly cancelled at the outset of his economy drive. That action brought about the wrathful resignation of Secretary of the Navy John L. Sullivan, and some unkind words by Adm. Louis E. Denfeld, who later was ousted as Chief of Naval Operations.

The keel of the big controversial flush-deck carrier *United States* is still lying bare at Newport News, Va., but top defense officials say that Adm. Forrest P. Sherman, Chief of Naval Operations, has not advanced a plan for reviving it. Rather, they say, he spoke of plans either to remove or change the island structure on several present carriers—presumably the 45,000-ton *Midway* class—so as to accommodate larger planes. But, they add, that is a plan for after the Korean war, not during it.

Recently the Navy has swung to the idea that if and when it does build a big flush-deck carrier that ship may not be quite as large as the originally contemplated *United States*. It may be shorter, but faster—slightly smaller all around.

Such a design would give the ship more speed and maneuverability. Also, improvements during the past few years in catapult launching and arresting gear techniques may have contributed somewhat to the modified idea about the size of a flush-deck carrier. END

Robot Pilot

(Continued from page 19)

do something else. It was lots of fun and I gave the trim little Cessna a good workout, not to mention Mr. Morris. And then I came down to land. Having flown hardly anything but big airplanes for 20 years I landed 16 feet up, of course, and thus I tested the Cessna landing gear without any intention of doing so.

"Let her come down!" Mr. Morris yelled.

"Hell, I ain't going to stand in her way," I yelled, since it was my turn. "I ran out of ideas a 100 yards back."

The landing turned out smooth and sweet and now I am confident that I have mastered how to land the Cessna. Just level off like a Dizzy Six and shut your eyes. When we were on I laughed and Mr. Morris laughed. It sure is handy sometimes to be known as a humorist. It was easy for me to laugh. It was his plane.

Well, that was the Cessna. The Lear lightplane autopilot is so new that as this was written there were only three of them in the hands of the customers so it was lucky for me that in Chicago there was another one, this one in a Beech *Bonanza* owned by Merrill C. Meigs who is publisher of the Chicago *Herald-American* and vice-president of the Hearst Corporation. He is the fellow that they named Meigs Field—the lake front airport—for, not after and that was a great compliment because they didn't insist that he be bumped off beforehand as has heretofore been the custom in such matters. So I got a chance to try out the Lear autopilot in a different lightplane and it turned out to be a bit of drama before it was over because I was shanghaied.

I got Johnny Stipe of Acme News pictures, an old Navy hand, to take the shots of the installation, and Mr. Meigs then suggested that we go up and feel her out. Believe me, I was really getting up in the world having him for a co-pilot. You should have seen that flying parlor. It was fitted up with just about everything, even having an air cooler which worked beautifully. All it lacked was a stewardess.

This day, too, was embellished with a cool air mass and a hot sun and the air was mighty choppy. We took off and sailed along the lake front and then turned to 300° and Mr. Meigs flicked on the Lear autopilot. "After testing out this thing, what else do you have to do this afternoon?" he asked.

"This is all," I replied.

"That's good," he said, "because we are now on our way to St. Paul." Protesting was no help. I looked over the side but gave up that idea and went along. And I am glad that I went because I got an excellent idea of how the autopilot could do a job of straight line navigating, a job so much more accurate than a human pilot can do, especially in a short coupled airplane.

Enroute we landed at LaCrosse, Wis., Mr. Meigs making the landing and it was as smooth as a colt's nose and not a bit gaudy as we have come to expect from busy business men who get most of their flying off the handle.

We couldn't pick up the tower at LaCrosse at first so we set the autopilot to circle the airport while we dug up books of reference to look up the frequencies. The *Bonanza* circled patiently until we were ready. Both hands of the pilot were free and his attention was not distracted, something that can be very useful in emergencies of all kinds, as can be imagined. We never did manage to talk to the tower, though. We had an excuse for that. They don't have a tower.

On both legs of the flight to St. Paul we set the autopilot on 300° and after an hour of choppy air it was still on 300°. Here is one of the big benefits of an autopilot for lightplanes. We studied charts at our leisure, looked up airport data, took bearings and plotted positions, made calculations, and things like that. I filled a couple of pages in my note book. We were at ease. There was no fatigue because our attention was relaxed and so were our muscles.

It is much easier to navigate a big plane than it is a little one because the big ones are fairly steady as to direction. It is a good deal like steering a ferry boat as compared with a canoe or a little motorboat. In the little boat you always have to be on the rudder.

When flying cross-country in a lightplane the nose is always getting off to the right and then off to the left and it is a job to bring it back on course with the compass swinging away. A lot of subconscious averaging is going on all the time. One of the reasons an experienced pilot has an easier time of navigating accurately is that his subconscious mind is trained. He averages the amount and also the time the plane is off to the right and to the left, and although this is done automatically in his mind, even so there is some mental strain and fatigue. You don't realize how much until you have an autopilot to do it for you.

When the visibility is poor is when the autopilot is most helpful in navigation. You can't see the next landmark so you calculate when you should pick it up and the autopilot will steer you straight. When you do pick it up you note how much right or left you are from where you should be and then it is simple to set the correction on the autopilot and so allow accurately for your drift. You don't have to wonder how much was drift and how much was your steering.

You are relaxed and you stay fresh. If an emergency should come up you are in fine fettle to meet it. In thick weather you are not dulled from staring at the instruments and you are able to keep from being hypnotized and that is very important.

The lightplane autopilot, then, is a mighty good thing for cross-country trips, but there are other benefits. Should you have an autopilot and get caught blind you won't have to worry about getting behind the instruments no matter how sensitive your plane is. Without an autopilot it is easy to get behind the instruments and try to catch up and then you overcontrol. When this happens you are

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in oscillation as a result of your reaction time lag. A human being can go into oscillation, too, believe me.

And thunderstorms are a problem. In the summer there are likely to be rain clouds spotted around and you hate to quit just on account of them, but you can run into a thunderstorm without meaning to come near one because of haze or general cloudiness or having it start to rain fairly heavily where you are. When you run into one, your instruments dance all over the place and no man can follow them. If you try to do so you are very likely to put stresses on the airplane that no such airplane is designed to withstand.

For example, a pilot may get into a thunderstorm updraft even if he is well below the cloud and it starts to rain and he can't see out worth a whoop, and his draft. What do you do? Well, besides practicing a little praying to be ready if things get worse, you set the turn knob for a gentle precision turn and you get the hell out of there.

Then there are cases where the airport you are going to suddenly gets closed in. You may have the choice of landing in a farmer's field or making a blind approach. Blind approaches are not the easiest things in the world. Without thousands of hours of practice it is doggone hard to keep a constant watch on the altimeter, the glide angle, the climb indicator, the air speed, the direction, the lateral attitude, and at the same time steer a precision line. (When you have thousands of hours it is plain hard.) Of course it doesn't help things any to take a sneak look every now and then to see if you are able to pick up the ground and

planes is very much worth while if you can afford it, and they should get cheaper in time, as do most things.

There is only one fault with this autopilot that I noticed and that is a fault that the big expensive ones have even in greater measure. If it is not adjusted just right there is a tendency for it to flutter the controls, one control or another. With the big plane autopilots an oscillation will start which may stop after a few wiggles or it may continue until the human pilot does something about it. Such behavior is not dangerous so far as I know but it is annoying. It seems a shame, too, since it is a fault that should be very easy to design out. (According to Lear, this trouble has been eliminated in the production autopilot.)

There is only one danger in flying with an autopilot if you are flying alone and

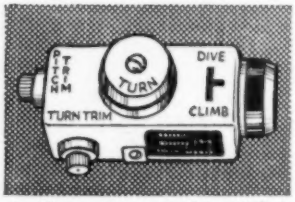
HOW THE LEAR AUTOPILOT WORKS

THE Lear Autopilot consists of an amplifier unit, a triple servo actuator unit, three follow-up units, a small flight controller unit, an elevator trim tab motor, and electrical pick-offs from the panel-mounted flight instrument gyros. The combined total volume of the units is approximately one cubic foot and total weight is 36.15 pounds (autopilot 25 pounds and panel mounted flight instrument gyros 11.15 pounds). It is the first U. S. production autopilot suitable for use in personal aircraft.

Basically, the autopilot works on well-known gyroscopic principles by which electric signals are given when the plane axes change in relation to the gyroscopic axes. The signals are amplified, filtered and relayed to servo motors which actuate the flight controls.

The controls consist only of an engage switch and a small flight controller, both mounted in the cockpit. These controls provide complete autopilot control.

Here is the procedure for operating the autopilot:



1. If a master autopilot switch is installed it must be turned on.
2. The "turn knob" is placed in the "detent" position. The autopilot will not operate if the turn knob is out of "detent."
3. The "pitch knob" is positioned to place the reference line on the knob in line with the reference knob on the "controller box."
4. The "engage switch" which is usually mounted on the control wheel, or stick, may now be turned to "on." The autopilot is now operating and is controlling the aircraft.
5. To turn left, turn the "turn knob" slowly to the left. To turn right, turn it slowly to the right. To return to level flight, turn the knob slowly to the "detent" position.
6. To dive, turn the "pitch knob" away from you. The angle of dive is determined by the amount you rotate the "pitch knob." To climb, turn the "pitch knob" toward you.
7. Automatic pitch trim operates whenever the autopilot is engaged.

The autopilot can be easily disengaged by placing the "engage switch" in the "off position." The human pilot can also override the autopilot with little effort at any time.

The autopilot now sells for $2,990, and a two-month delivery date is quoted. It is CAA approved now for *Bonanzas* and Cessna 195's.

An approach coupler for approximately $1,000 and an altitude control for approximately $750 are expected to be available soon. The approach coupler permits the autopilot to tie into the ILS beam and make an automatic approach to the airport. The altitude control allows the autopilot to fly a constant pressure altitude on cross-country flights.

climb indicator will read a couple of thousand feet a minute climb.

He will instinctively feel that he is nosed up and so he pushes forward on the flippers and noses her down in order to keep level and then he picks up a lot of speed. Pretty quick he runs out of the updraft and then he sees that he is going down mighty fast so he pulls up sharply. Now, thunderstorms are composed of cells, and it is not unlikely that when he sees his altimeter unwinding and pulls back on the flippers he will run smack into another sharp updraft while his forward speed is quite high. There is lots of load on his structure and the slap of the updraft is just too much. He finds himself sitting up there without his wings on which is very embarrassing.

Now, with an autopilot, when you get that upsy-daisy you know that you are not nosed up, you know that it is an up-

have all of the instrument hands waving good-by to you.

With the autopilot you get lined up back far enough and as you approach in level flight you make your track corrections. At the right place you set the autopilot for the rate of descent that you want. She is as steady as a banker when you ask for a loan. It is all right now to take a look out from time to time to see if the ground is where you left it. You make a little correction now and then as you approach, but soon you don't have to do a thing, except cuss the weather man, because she is going to come in all right. You are not going to go into any oscillations that get bigger and bigger. And the reason is, of course, that the autopilot is purely mechanical. This is one of the many cases when it is a decided advantage not to be able to think. My opinion is that the autopilot for light-

that is going to sleep. This is something that will have to be guarded against, especially if you are flying at night when you are tired, for the autopilot requires so little attention you relax completely.

A somewhat larger Lear autopilot is now being installed in jet planes for the Air Force. The Air Force and the airlines are just beginning to find out that a tired pilot is not a good pilot.

Well, I liked this autopilot very much but I made only two test flights with it. Here's what the owners say:

Mr. Morris said, in answer to a couple of bystanders, "How do I like it? Well, I can tell you in a few words. If I couldn't have the autopilot I would forego the airplane."

Mr. Meigs said, "I actually rest up when I fly cross-country. The autopilot is the best thing they ever put in a light airplane." END

Make You Tired?

(Continued from page 29)

for a time, but then progressively deteriorated as fatigue took its toll.

Another result of the test was very important. The pilots' judgment in making maneuvers seemed to improve, indicating they were learning how to carry out the maneuvers in spite of fatigue. But timing errors increased as fatigue developed.

Without exception the pilots finished the tests perfectly satisfied that they had improved steadily throughout. Even at the end of the test they were aware of their dissatisfaction with attempts at control in the early stages of the test, and realized that their attitude had changed gradually to one of satisfaction in the later stages. But they were completely unaware that this change represented a satisfaction with an increasingly lower standard of performance!

When the pilots were fresh they regarded the side-slip needle as being satisfactorily centered if it fluctuated only within 2° or 3° each side of vertical. As fatigue developed, this arc of allowance was unknowingly widened to 5° and then to 10°, until finally when the pilots were really fatigued, the needle was allowed to swing from side to side—just so it didn't jam one side or the other.

In the same manner, airspeed was kept within five or 10 m.p.h. of the correct speed at first, but as the test continued the variation became greater and greater until in the fatigued state little or no attempt was made to control it. The number of stalls increased rapidly.

Many pilots said that toward the end of the test they had given up looking at their clock and stop-watch and had decided to estimate time intervals between maneuvers. The intervals varied between 1½ and five minutes and they were convinced that such estimates were within their powers where in actual fact they were as much as 200 per cent wrong.

The first instrument to cause difficulty was the artificial horizon, which requires an intellectual appreciation of its meaning. It is this intellectual grasp of the situation which disappears in a fatigued person.

Here are some other factors which showed up: Irritability; amnesia for side instruments; more than 80 of the 140 pilots tested landed with the gear up; pilots' statements of what occurred grew progressively unreliable; there was an increasing awareness of physical discomfort; complete mental lapses occurred.

The RAF report concluded that the signs and symptoms of flying fatigue remain substantially the same from pilot to pilot and that the pilot himself often does not know what the signs are or when he begins to express them. The signs of flying fatigue rarely if ever indicate a state in which the correct maneuver can not be performed but only one in which it will not be performed unless the pilot takes particular care.

As they grew more and more tired, the pilots set themselves progressively easier tasks and were satisfied with poorer and poorer performance. If a ship is momentarily out of control, a fresh pilot can glance at his instrument panel and see it as a whole. Thus he knows immediately what correction to make. A fatigued pilot seems unable to comprehend his panel as a whole but makes the first conventional move that occurs to him.

Some very serious problems of flying at middle altitudes were discovered at the University of Chicago. A small group of men 17 to 28 years old were exposed to simulated altitudes varying from 10,000 to 18,000 feet for four to six hours per day, six days per week, for four to six weeks.

One test given to the men was the so-called "Dynamic Visual Field Test." The subject was required to determine the presence of a graduated circular patch of light briefly exposed to the periphery of his visual field at the same instant that

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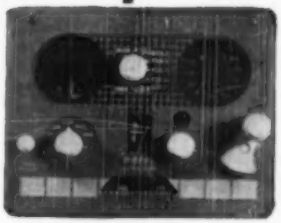

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a form and color discrimination test was being made on center of his visual field.

All persons tested showed marked impairment in their ability to pass the test successfully and their vision was weakened. The impairment didn't show up until the subject had been in the experiment for several weeks, but its complete disappearance took days or weeks.

Like the British pilots, those who took the Chicago tests were completely unaware of their poorer performances.

There are other temporary losses in ability to perform certain visual functions at altitudes of 10,000 feet or higher, but they are fleeting and the individual quickly returns to normal once he can breathe normal oxygen concentrations.

This was different. It was an extremely dangerous form of blindness which developed insidiously as a result of intermittent exposures to altitudes as low as 10,000 feet!

In the past it had generally been accepted that flying at 10,000 feet was harmless to pilots. However, this new discovery stimulated further studies at altitude.

Fourteen of 17 subjects showed an increase in the lactic acid content of the blood at 10,000 feet. As a result it was concluded that they were showing varying degrees of anoxia.

The eight investigators who were working in the pressure chambers doing the testing made a most striking report. They averaged 30 to 45 years old and all were trained in scientific observation. They agreed unanimously that working at 10,000 to 11,000 feet without oxygen impaired their muscular coordination, efficiency, memory, and clarity of thinking. There was a marked loss of initiative, and unusual concentration was necessary in making observations. There was a tendency to sleepiness, irritability and moodiness.

All evidence indicates that flying at 10,000 feet without oxygen should never be attempted for fear of anoxia (lack of oxygen) which is in itself a form of fatigue.

What makes you tired? An understanding of the basic facts will help you understand how the peculiar conditions of flying add to fatigue.

Briefly, muscular and mental activity depend upon a transformation of energy. The immediate source of muscular energy is a carbohydrate substance called glycogen. In the release of energy, glycogen is changed to lactic acid.

In recovery, lactic acid is reconverted to glycogen by the action of oxygen. In the process, about one-fifth of the lactic acid is converted to carbon dioxide and water. There is an increased heart beat and more rapid breathing. As the lactic acid is formed, more oxygen is needed, and an accumulating *oxygen debt* develops which must be regained.

At high altitudes without an artificial supply of oxygen, it is impossible for the pilot to obtain enough oxygen to meet his ordinary needs, let alone enough to pay back his *oxygen debt*.

But it would be wrong to imagine that the causes of pilot fatigue are solely physical.

Repeated investigations have found that important factors in fatigue are the physical condition of the pilot, home conditions, financial circumstances, outside businesses, days off since last flight, how leisure time is spent, sleep and rest habits, length of time awake before flying, travel time to and from airport, quality of food, bad news, doubts as to condition of airplane, and others. Worry, fear and anxiety, personal mental maladjustment, lack of exercise, excessive use of alcohol or tobacco all are significant.

One Air Force report deals with 46 men who flew 2,000 miles in fighters with only one stop, during which time they remained in their planes. They were in the planes approximately 10 hours. Seat discomfort was their worst complaint; the second was boredom or monotony. Twenty-eight of the 46 complained of sore backsides, and 24 of cramped space. Twenty-two complained of stiffness in back and legs, and 20 of glare. Nineteen had difficulty staying awake.

Twenty instructors, in another study, were given a six-week fatigue test. They were from 21 to 28 years old and were averaging 118 hours of flying per month. Here are the principal conclusions:

1. The younger men were slightly less affected than the older men.
2. The greater stress occurred when there were both day and night flights.
3. Seventeen of the 20 required one to two hours additional sleep each night.
4. Subjectively, fatigue was shown by such feelings as continuous tiredness, pronounced afternoon fatigue, increased irritability, diminution in mental alertness, ringing in the ears.

Aside from the altitude hazards, which have been mentioned, flying creates special problems that cause fatigue.

HEARING. One study of 74 cadets showed that 19 per cent had hearing losses of 15 decibels after a period of 70 hours of training, and 11 per cent showed gains. Losses were generally associated with frequencies of 2,000 to 5,000 cycles per second. After a second period of 70 hours there was a tendency to regain hearing. Forty of these men were examined after a third 70-hour period of pilot training. A small number showed a slight loss of high tones but no case was discovered where hearing or speech was affected.

Actually, however, relatively few facts have been established about the harmfulness of noise. Scientific studies do not agree that noise affects output or speed of work materially. While noise does detract from efficiency in many cases, it has not been established that this is true of flying airplanes.

LACK OF SLEEP. Again, no direct studies have been made of lack of sleep and pilot efficiency, but general tests show that loss of sleep causes decreasing accuracy in similar precision work. There is difficulty in tracking objects with the eyes.

LONG HOURS. In any branch of effort, long hours of work have a harmful effect on efficiency, but much of this can be offset—at least temporarily, by sufficient motivation. Apparently when motivation is high, good performance does not drop off substantially.

VISION. Altitude has a direct effect upon night vision in addition to the peripheral vision effects previously noted. Assuming the eye to operate at 100 per cent efficiency at ground level, 126 per cent as much light is necessary at 5,000 feet; 159 per cent at 10,000 feet; 178 per cent at 12,000 feet; 240 per cent at 16,000 feet. Oxygen should be used on all night flights.

15 YEARS AGO

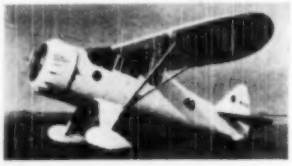
FROM the November, 1935, issue of this magazine:

Famed Russian pilot, Sigismund Levanevsky, was the first to advance the idea of flying to the United States by way of the North Pole—the shortest route. [While on a flight from Moscow to the U.S. in August, 1937, Levanevsky and five crewmen reported they had flown over the Pole and were nearing Alaska; that was the last time they were ever heard from.]

The world was shocked by the news that Will Rogers and Wiley Post had been killed when their seaplane crashed near Point Barrow, Alaska.

Editor's comment: "We should insist that we are provided with the latest and best military flight equipment that it is possible to procure. The old story of the ostrich with its head in the sand applies with particular force to our present status as an air power."

Ben Howard, flying his Howard DGA-6 "Mr. Mulligan," won the Thompson Trophy Race with a speed of 220.194 m.p.h.—the first time that a standard cabin plane had ever won the Thompson. Two days later "Mr. Mulligan" won again, placing first in the Bendix Race with a speed of 238.704 m.p.h. [Still active in aviation, Ben Howard is now general manager of the Fairchild Aircraft Division.]



The Waterman "Arrowplane," a tailless two-place pusher powered by a 100-h.p. air-cooled Menasco engine, has a top speed of 114 m.p.h. and landed at 30. After a flight from California to Washington, D.C., John Geisse—Chief of the Development Section of the Bureau of Air Commerce—remarked, "The Waterman is almost fool-proof . . . it could not be stalled or spun by any normal or reasonably abnormal use or abuse of the controls."

TWENTY YEARS AGO

Professor Piccard of Brussels proposed that a specially-constructed balloon be sent to a height of more than 10 miles to study cosmic rays, which he believed were given off by disintegrated atoms in outer space.

All American industrial experience shows that fatigue is a direct cause of accidents. It is even possible to correlate the hours of the day in which workers are most fatigued with the accident rate. For instance, accidents tend to increase with each successive hour of work in the morning, reach a maximum about 11 a.m., and fall toward zero at the noon hour. The number and rate rise sharply following the noon hour, reach a peak toward the latter part of the afternoon, and drop off somewhat when the rate of production falls during the last hour.

But in flying, the last hour is the hour of landing—the most important hour of the work day. There can be no falling off in the rate of production, in accuracy of work, in eye tracking during that time or it will indeed be the last hour. And here is the main danger of pilot fatigue—the amnesia for side instruments, the carelessness of altitude and navigation, the inability to grasp the panel as a whole.

But there is a solution. The RAF study has clearly shown that the pilot can call forth the desired skill if he realizes the need for it.

For the long run, the cure for being tired is rest and sleep. Airline pilots are limited to 85 hours a month. Inexperienced pilots should fly much less. They should not fly too long at a stretch. There's nothing about most cases of fatigue that a good night's sleep can't cure. END

STAY BRIGHT IN THE COCKPIT

(The author hasn't pulled these out of a hat. They're based on psychological research, mostly by the Royal Air Force.)

1. **Get plenty of rest. You will need to sleep one to two hours longer each day if you fly regularly. If you have a long flight ahead, sleep for this flight.**
2. **Eat and drink (and smoke!) moderately before you fly.**
3. **Exercise moderately in your leisure time.**
4. **Don't fly too long at a stretch.**
5. **Move around in the cockpit or in the airplane. Stretch deliberately.**
6. **When you begin to feel tired, drink coffee, eat a sandwich. Caffein is one of the best stimulants you can take, but don't drink too much coffee too early.**
7. **Wear comfortable clothing.**
8. **Never fly over 10,000 feet without oxygen or pressurization.**
9. **Don't worry over your personal affairs. (Of course you often can't help it, but if you're distraught, don't fly.)**
10. **Fly only planes in which you have confidence, in weather with which you are familiar, by navigation means that you know thoroughly.**
11. **Get yourself a two-way radio if you can.**
12. **If you have plenty of the long green, an autopilot will save you an enormous amount of energy.**
13. **This one is purposely numbered 13. Remember, the most exacting moment of your entire flight usually comes when you are most exhausted: your landing.**

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There's No Shortcut

(*Continued from page 21*)

Assistance Program have been raised to $850,000,000, bringing the grand total to $7,522,000,000—a truly impressive figure.

Not all the money for building up the air strength of MDAP nations will be spent in the U. S. But it now appears that U. S. plane makers will receive a larger portion of this business than originally contemplated. The revised plan calls for 1,600 new jet aircraft for countries on our side. It was felt for awhile that much of this production should be diverted to other countries—particularly to England.

But in view of the need for stepping up the rearmament timetable there has been a shift in official thinking. It is now believed that the bulk of these orders should be placed in the U. S.—at least at the outset—because British and European plants are not geared to large scale production.

Actually, the new program will only bring the Air Force up to 69 groups. But there is another way of appraising the situation which justifies the prediction that it will result in the equivalent of 75 groups. The explanation is that the number of medium bombers in each group is being beefed up from 30 to 45. Not all of these planes will be fitted out as bombers. Some will be used as tankers. But in this capacity they will be just as effective in giving the groups more striking power.

When the AF's expansion program was whittled down a few years back and the 70-Group objective was reduced to 48, most of the cuts were made in planes scheduled for ground support and troop carrier operations. The high command considered ground support and tactical bombing less important than air defense of the continental U. S. and retaliatory strategic bombing of an aggressor.

Moreover, it was contended that new planes for ground support operations could be provided as fast as the Army could recruit and train new divisions. The fact that the Army now is being expanded makes it doubly necessary that the Air Force place immediate orders for ground support planes.

For obvious reasons, defense officials do not intend to spell out all the details of the new production. After all, there is no excuse for tipping their hand to the Kremlin. But it is known that a large chunk of the money will go for fighters. Since there is no plane designed solely for tactical missions with the infantry, fighter types will double for such assignments. Air Force quipsters say there is no such contraption as the Army's "ideal" ground support plane—one that can stay over a target for five hours or so, throttle down to a speed of 10 m.p.h., and land on a cowpath.

In general, it is said that additional orders will be placed for every plane now in production. Also it is known that the production line for the B-50 will be opened up again and that there will be increases in contracts for the B-36 and the new Boeing jet bomber—the B-47. The AF thought it was through ordering B-50's, which are a re-engineered version of the B-29—but that was before the Korean War.

Later, there will probably be production contracts for planes not now in actual military use such as the Lockheed *Constellation* with the lengthened nose—the L-1049—and the huge Douglas DC-6B. The need for long range transports of this sort is becoming increasingly apparent. They would come in mighty handy in the Korean campaign.

To speed up the procedure, the Air Force has sent letters of intent to some 200 firms producing planes, engines, electronics devices and other equipment. These letters are official signals to go ahead pending drafting of the actual contracts. They specify the amount of the order and the price. Another flock will be sent out shortly. The Navy expects to follow suit as soon as it has ironed out some of the details of its program.

For its part, the Navy is said to be shooting toward a goal of 14,500 aircraft. One of the points made clear to Congress in spelling out policies under the new program is that Naval aviation will no longer be looked upon as a kind of poor sister. It will be kept at the same state of relative readiness as the Air Force.

As far as the immediate wave of business is concerned, the industry expects to take things more or less in stride. It will have to expand employment, of course. At the outbreak of the Korean War it had 254,800 workers. By early fall it expects to have 500,000. But new airframe plants will not be opened, nor will additional workers be trained. Industry spokesmen say there are enough trained workers available to handle this limited expansion.

But a few bottlenecks are foreseen. For one thing, draft deferment policies for essential workers are fuzzy. The trouble, as usual, is that the various Government agencies involved cannot agree. The Air Force wants a one-year moratorium on drafting key workers in the aircraft industry. The Munitions Board and the National Security Resource Board oppose such a long exemption because they fear it will establish a precedent for other critical defense industries.

As the Aircraft Industries Association sums up the situation, plane makers face three major problems: (1) keeping trained engineers, scientists and technicians out of uniform, (2) retaining those the industry now employs, and (3) recruiting more trained workers. The industry is particularly worried about engineers who hold reserve commissions. Some estimates are that as many as 25 per cent of the key men may be involved. The only help that the Government has proffered along this line is a proposal by the Munitions Board that deferment be handled on an individual basis. Harassed plant managers do not believe that this solution would prove very effective.

No undue difficulty is anticipated in obtaining materials and equipment. The Air Force and Navy are ordering parallel increases in the production of engines and other items they procure direct from the manufacturer. The aluminum industry has said it will be able to take care of the requirements of the plane makers.

As a matter of fact, manufacturers will not reach the point of heavy production until next spring. At that time the new planes will really begin to roll off production lines. Unless the Korean War is prolonged beyond the most recent Pentagon forecasts of an end of the fighting by March, not one of the new planes will be completed in time for service in that arduous campaign. But of course it is the troubled state of the world generally and not merely the need for meeting the Communist challenge in Korea that has prompted the step-up in rearmament.

If all-out mobilization should become necessary, the whole picture would be changed. In that event, the aircraft industry would need to use all the reserve factories available and would also have to resort to subcontracting on a large scale. Also, drastic manpower mobilization would become a must. It is gratifying to note that Washington is already grappling with the problems involved in throwing the nation's economy into high gear to meet a major crisis. END

Grasshopper Destroyer

(*Continued from page 26*)

easy maintenance is necessary for equipment designed for advanced areas.

● Low wing and power loading. The bantam fighter must be able to take off rapidly and turn tightly.

● Excellent field of vision—360° flat vision or as close to it as possible is highly important. Survival and usefulness depends on seeing the enemy.

● Two to four fixed rifle-caliber guns. While a single .30-caliber machine gun is adequate to put a liaison plane out of business, more firepower would be necessary to fight the enemy's bantams. Hence the need for two to four .30's.

● Minimum 200-mile operational range. This range appears adequate since the L-plane and bantams are concerned only with a concentrated local problem.

● A broad speed spectrum. The maximum speed should be at least 250 m.p.h. and stalling speed under 40 m.p.h. Yet there should be combat-quality control at 45 to 50 m.p.h. [This proposed speed range has never been built into any plane.—Ed.]

● The ability to operate from crude frontline airstrips.

● Ultra-fast readiness to take off. There should be some provision for immediate power plant use—some system for retaining engine temperatures on the ground so that if an L-plane is spotted the bantam can take off without any warming up. This is one characteristic that would make the turboprop quite useful.

It is quite possible, too, that the purpose of the plane might be broadened to include its use in certain ground support activities, such as strafing enemy troops, and it might even mount HVAR rockets in emergencies.

Several tentative designs for a wicked little fighter plane with these characteristics are outlined here.

The authors' idea of a good configuration is a mid-wing twin-boom pusher, fitted with a tricycle landing gear and powered by a 300-h.p. radial engine. The engine would be installed in the streamlined center nacelle behind the cockpit and power would be delivered to the propeller by means of an extension shaft. Placing the power plant at the center of gravity would enhance maneuverability.

This projected bantam fighter would have a span of about 30 feet, an overall length of 19 feet. Magnesium would be used extensively to save weight. Wings and empennage would be fabric-covered. The main surfaces would be equipped with full-span leading edge slots and area-increase flaps. Armament should consist of four .30-caliber guns firing forward.

The noted French designer, Maurice Henri DeLanne, has suggested that his Pardel DuoMono configuration might be adapted to solve the bantam fighter problem. He too suggested a pusher design in order to obtain maximum vision. The DuoMono idea uses two sets of airfoils in an arrangement that somewhat resembles the old-fashioned highly staggered biplane. The rear airfoil combines the functions of a lifting member as well as the stabilizer-elevator.

The trailing edge of the rear surface contains two pairs of movable surfaces. One set acts as ailerons, the other as elevators. There is a slot-like interaction between the two sets of airfoils that furnishes continuous flow of air over the rear plane, even at low speeds. This gives the design excellent slow-speed control, a primary requirement for bantam fighters.

Vincent Burnelli, too, the inventor of the lifting fuselage design, has showed interest in the problems of a bantam fighter. He would use his body-lift idea —the airfoil shaped fuselage with outer panels, tailbooms, and conventional empennage. He proposes a light design with two engines installed inboard in the fuselage delivering their power to propellers through extended shafts. Light armor would protect the power plants and pilot. He offers extremely short landing legs which would be retractable.

Of existing designs, Bell Aircraft's XP-77 looks closest to what would be required. This little fighter, with a span of 27 ft. 6 in. and an overall length of 22 ft. 11 in., was developed as a light interceptor in 1943. It was intended for the local defense of airports and airstrips against low-flying bombers. It was powered by a 520-h.p. air-cooled Ranger engine and carried a .20-mm. cannon firing through the hub and two .50-caliber machine guns. If some of this armament weight were stripped off and high-lift flaps added, this design might be a good starting point for the development of this class machine.

Korea is proving again the value of the liaison plane. It has emphasized again the vital role of the foot soldier and the ground attack. Any enemy must be denied use of this valuable lightplane tool. END

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I Learned About . . .

(Continued from page 38)

I don't know how long we cloud-hopped. Neither I nor the other pilot noticed that the sun had sunk low, and that Mauna Kea had drifted far to the rear. Subconsciously, we were just flying until the cloud bank ended, paying only casual attention to direction, none to time.

Only when the sun's lower rim touched the horizon did we realize that the break in the clouds was long overdue. By then, the fiery red sun had turned the clouds to pink and deep purple. In 30 minutes it would be dark.

I poured on full throttle, leaned out the fuel mixture and reached for more altitude. From 13,000 feet, the sea of clouds was still flawless. The overcast extended to the horizons, broken only by the mountains reaching up through.

Suddenly, something about the mountains didn't seem right. There were four of them, one too many. I did a 360° turn just to make sure. I spotted the three I knew, and this other one. There wasn't another mountain on Hawaii tall enough to show above the clouds, which must have been 7,000 feet at their lowest point. This stranger topped that by a good 2,000 or 3,000 feet.

I radioed the other pilot to ask him what it was and where we were.

"I'm just following you," he said. That wasn't helpful.

We talked of going back to Hilo, the way we had come. There may have been too many mountains, but I could still pick out Mauna Kea, and Hilo would be at its base along the coast. The big question, though, was: would Hilo still be open. The weather had been lousy when we left and usually got worse towards evening.

I checked the fuel supply. Maybe I had five gallons altogether, no more. The other plane was no better off.

However, it would be "down hill" all the way back. Maybe we could make it before the fuel gave out, but not before dark. The sun had already set.

We tried calling our strip on the chance someone might have guessed our plight and rolled out the radio jeep. We hoped they could give us the weather down there if they heard our engines above the overcast. No answer.

By then I had been praying for some time. No one was shooting at us, nothing so dramatic, and there was plenty of free clear air all around. But we were stuck at altitude 10,000 feet, fuel nearly gone, night coming on fast, no radio contact, not sure of our position, and nothing but clouds and mountain tops in any direction. There was simply no way down.

We had enough instruments to let down through the clouds but we hadn't even the slightest radio contact. It would have been suicide. Below was a choice of jungle, lava beds, mountains, or ocean. We knew for a fact that a large part of the island was closed in, ceiling zero, but we didn't know how much or where we were.

We thought of bailing out. If we landed in water we had our emergency rafts and could probably make it to shore, but if we landed on a mountainside or a lava bed we might never make it back.

We decided to try reaching Hilo, to bail out if we didn't make it. I whipped the plane into a flipper turn—no time to waste now. As I did, something flicked past my eye. It took a second for it to sink in. It was a break in the clouds! In my haste to get back to it before it closed up or I lost it, I put the plane into a tight chandelle.

All this time I had heard nothing from my passenger. Now he tapped my shoulder.

"Please, lieutenant, take it easy; I'm sick." He had his cap to his face.

I shouted for him to go right ahead, get sick as much as he wanted; that I had found a hole. He later told me he hadn't the slightest idea anything was the matter. Right then he got sick.

QUIZ

If you know only the model number of a plane, can you name the manufacturer? Test yourself with this quiz. You're an old-timer if you are able to match all 16 correctly.

1. 202	( )	a. Cessna
2. 247	( )	b. Waco
3. D17S	( )	c. Martin
4. PA11	( )	d. Culver
5. DGA15	( )	e. Aeronca
6. SM8A	( )	f. Ryan
7. 7W	( )	g. Convair
8. N	( )	h. Fairchild
9. STM	( )	i. Stinson
10. 11	( )	j. Taylorcraft
11. 22	( )	k. Beech
12. V	( )	l. Spartan
13. 7AC	( )	m. Boeing
14. 195	( )	n. Piper
15. BC12D	( )	o. Howard
16. 240	( )	p. Lockheed

(a) 9. (b) 8. (c) 5. (d) 10. (e) 6. (f) 15. (g) 7. (h) 14. (i) 9. (j) 11. (k) 12. (l) 13. (m) 4. (n) 3. (o) 2. (p) 16. (q) 1.

I found the hole again. It wasn't more than 50 feet in diameter, and looked as though it would close any minute. I circled about 300 feet over it trying to figure out what was below, and what kind of ceiling was down there. All I could see were flecks of white on a dark background. It could have been one of the many mountain streams that plunged down Hawaii's northern coast. In that case it was ceiling zero. Or it could have been the ocean with at least a 1,000-foot ceiling.

I decided it was ocean, and after radioing the other pilot of my discovery, flipped the plane over on its back and dove through in a vertical spiral. I tried hard to stay out of the clouds but even so half the descent was blind as we darted in and out of the tight little tunnel's wet grey walls. Our airspeed bettered 200 knots, well over the plane's red-marked diving speed. But I didn't dare leave the hole to make a more gradual glide. I wanted to keep a constant eye on the "ocean" below just in case it turned out to be something else.

We broke into the clear—out of the clouds, that is, for it was far from clear—at about 2,000 feet. The sky overhead was a black scudding overcast and it was raining. Below was ocean. Through the late twilight gloom and the rain, I could see land a long way off, and started for it. But something didn't seem right, and when I looked at the compass, I saw why: I was flying northwest. Since we must have over-shot Hawaii, it should have been southeast.

I circled and saw land to the east as well. That explained the mystery of the extra mountain. We had popped out almost halfway to Maui. The two islands were over 40 miles apart. That fourth mountain, appearing much closer than it actually was, turned out to be Haleakala, Maui's better-than-10,000-foot volcano and the biggest crater in the world. The other plane, by now, was circling with me as we took off for Hawaii's coast.

By then I was switching from one tank to another every few moments. Both gauges were in the red; the indicator needles bounced on zero. Even though we were out of the clouds we weren't sure we'd make it back. But here we could see something besides clouds. It was a good feeling—even better when we crossed the coastline a few minutes later.

From there to Kamuela and our home strip was a matter of only a few minutes. It was dark by the time we finally landed and we had to follow the road for the last 20 miles, flying at tree-top level. It was the only way we could be sure we wouldn't hit a mountain in that pitch blackness.

Safe on the ground again, we found that the rest of the squadron hadn't even missed us, much less been worried enough to turn on the radio. Fine thing, but we were down and right then that fact and a cup of hot coffee were all that mattered.

Next morning when the planes were fueled, my plane captain reported I'd had less than three quarters of a gallon of gasoline left when I landed.

I can safely say, "I learned about flying from that." I had broken half a dozen cardinal rules of flying. The worst part of it all was—and this is too often the case—I had known better.

Now when I fly, no matter how short the trip, I check the weather and winds both along the route and at my destination; I don't take off unless I've got a full fuel load; I note my take-off time and estimate arrival time. If necessary, I make sure I've got radio contact at my destination. Once aloft, I navigate, make sure I know exactly where I am at all times. I don't go over the top unless I'm sure of the break ahead or have full instruments and radio gear necessary for an instrument let-down. And lastly, I make sure of a nodding acquaintance with all the mountains along the way and don't count on clouds being where they were some three or four hours back.

END

Props Go Supersonic

(Continued from page 30)

Furthermore, the *Skyshark's* design has other advantages.

It can take off in a remarkably short run with a munitions load over half its own weight. Its rate of climb is better than that of the best jets, and so is its radius of action with conventional fuel tanks. The tremendous static thrust of its contraprops permits it to lift a huge load from the carrier's flight deck.

Here's what E. H. Heinemann, chief engineer of the Douglas El Segundo plant, says:

"The A2D can take off in one-third the distance with a heavier load, climb faster, fly just as high and almost as fast, and deliver four times more bombs per gallon of fuel than it could if equipped with a pure jet engine."

The U. S. has certainly lagged behind Britain in turboprop development. England began to develop the turboprop during the latter part of World War II and even after the war our own services seemed to prefer the straight jet—probably because they regarded the propeller problem as insurmountable. But now this is all changed and a number of gas turbines have already been licensed or are being licensed for commercial use.

Besides apparent ability to conquer the sonic barrier, turboprop-powered airplanes have other advantages.

● **Producibility.** At first, we had no suitable heat-resisting alloys; later, when these alloys became available, their highly critical nature was a stumbling block. But extensive research and design has proved that many of the critical alloys can be replaced by more available alloys without affecting engine life. The net result: producibility problems have been reduced to a tooling and technique level. That, of course, is a time-consuming but not critical problem faced by builders of any complicated product.

● **Service life.** Pure jet engines now approach the average service life of reciprocating engines. It's logical, then, to assume that propeller-driving turbines will have the same wearability. The term "friction engine," humorously applied to piston-type engines, has a backbone of truth. Sliding friction found in some phases of piston-type engine operation is not found in turbine engines.

● **Maintenance.** The turbine engine is simpler than the large piston-type powerplant, has fewer moving parts, and requires fewer replacement parts. On the other hand, turbine engines (especially in single-engined planes) may be less accessible and more difficult to remove.

● **Vulnerability to gunfire.** The turbine's smaller silhouette presents a smaller target. Any engine is vulnerable to a direct hit by .50-cal. and 20-mm. projectiles; and the same holds true of average anti-aircraft shrapnel. But the turbine engine has an advantage over the piston-type: the fuel used has a low flashpoint compared with high octane gasolines; and the danger from fire is considerably minimized.

● **Military logistics problems.** The problem would be greatly simplified if turboprops alone, rather than a combination of reciprocating-powered and turbine-powered craft, were used. It would mean only one type of fuel would have to be transported and stored. Furthermore, turbine engine fuel is safer to handle, to transport and to store. It's also less critical to produce. And, in comparison between pure jet and turboprop fuel requirements, the turboprop rates far ahead.

The propeller-driven airplane is more efficient at low speeds for take-off and climb than the pure jet. This is its main economy, and is especially marked in high-speed airplanes. At the same time, propeller-driven planes are always more efficient than jets at speeds under 350 m.p.h.—and the slower the speed, the greater the advantage.

The critical factor is the successful development of an efficient supersonic propeller. That has now been accomplished. The nearly forgotten propeller, consigned to the ash heap by engineers, has now been rescued, thinned down, widened, polished, and strengthened for a new role—that of high speed flight. END

Powered Glider

(Continued from page 32)

don without power, then switched on the engine and returned to Germany.

In the U. S., the early low-powered airplanes like the Aeronca C-C2-C3 approached the power glider in wing loading and power—but they didn't have the performance because the features weren't as refined as those of a sailplane.

A couple of U. S. companies, Cycloplane and Crawford, developed true powered gliders in the early days. Neither of these depression-born craft were soaring ships, since they did not incorporate the refinements of sailplane design. But they definitely pointed the way toward power for sailplanes.

In 1931, an enterprising young Californian named Ted Nelson decided to build a powered glider. He tried motorcycle engines on several Eaglerock primary gliders, and finally developed a fairly streamlined power model. It was high-wing parasol type, with a fuselage similar to a Curtiss-Wright pusher—but the 50-h.p. Salmson engine was nicely streamlined into the center section of the wing. It operated a propeller in front—"tractor" type. The pilot sat in a well-streamlined cockpit. This power glider had the phenomenal climb of over 1,000 f.p.m. As a glider, however, it wasn't too satisfactory, as the prop and engine had high drag.

Meanwhile, the Germans were continuing their work. As a result of their engineering refinements, the *Hi 20* was built. Its prop was driven by an "outboard" engine similar to an outboard motorboat engine installed upside down. All except the *Hi 20* prototype had provision for retracting the propeller within the fuselage when not in use.

At the end of World War II, Ted Nelson

This Young Man took a few minutes out... to think about his FUTURE CAREER. Why don't YOU?

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Looking back... he remembers how easily he might have missed out on those few minutes. He could have been "too busy". He could have put off writing to "Cal-Aero" for pertinent information about a secure and profitable career in **AERONAUTICAL ENGINEERING**. He could have just done nothing.

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joined forces with William Hawley Bowlus, famed glider designer, and organized the Nelson Aircraft Corporation. The company first applied power to a modern glider by using a target drone 18-h.p. engine on a standard *Baby Albatross*. The glider's engine was enclosed and only the propeller was exposed. The plane's performance was surprising——and Nelson and Bowlus set about designing the *Bumble Bee* (later known as the *Dragonfly*).

They designed and built the first Nelson glider engine at San Leandro, Calif., and at the same time began work on forgings and metal parts for the *Dragonfly*. Design of the glider was no easy problem, as it had to be built to meet both CAR 03 (airplane airworthiness) and CAR 05 (glider airworthiness) requirements.

During some of this time I was associated with the *Dragonfly* development and kept a log of *Dragonfly* soaring and power time while it was at El Mirage airfield. About two-thirds of the total time the *Dragonfly* flew without power.

One important point was to secure more than enough speed for climb before take-off. Since the engine was of such low horsepower, a wind shift could cause serious trouble even though the throttle was fully opened. Unfortunately from the operator's standpoint, the maintenance and high initial cost of the powered glider required high insurance premiums, and since the wood structure did not lend itself to our desert operations, we were forced to abandon the *Dragonfly*.

In the soaring fraternity there are some who condemn the power glider as a hybrid and look down their noses at anything which takes away from pure motorless flight. However, these same individuals are only too eager to secure a low cost airplane tow as their launching means. Personally, I see little difference between having the engine conveniently attached to the sailplane or having it attached to a towplane 100 to 200 feet ahead.

On one occasion, Miss Lee Voges of the CAA and I were launched in a Corcoran *Cinema* sailplane for a soaring flight to nearly 18,000 feet by Myron Wells, who had been the test pilot on the *Dragonfly*. After about 30 minutes in the air, who should we see soaring next to us at 14,000 feet but Wells and a passenger in the *Dragonfly*. Together we spiraled in a large thermal and then, deciding to strike out for Victorville, we left the *Dragonfly*.

When we landed at El Mirage, we noted the *Dragonfly* was still gone. Then as we pushed the *Cinema* several hundred feet to its tiedown, we heard the low moan of the *Dragonfly* and watched it circle for a landing. Even in its approach we could see Wells firing up the engine. He completed his landing roll, and nearly beat us in securing his ship!

Today, Ted Nelson, after spending a young fortune on powered gliders, is developing what he believes is the ultimate in high-performance powered sailplanes. At Ted's invitation I flew a test pilot check on his new *Hummingbird*.

Late one evening I flew to Oakland and the next morning visited Ted in his San Leandro office. There I met Harry Perl, who did the aerodynamic and engineering design work on the *Hummingbird*.

We discussed many of the features of the present *Hummingbird* and of the new version which will have tandem seating instead of side-by-side arrangement. After lunch we towed the *Hummingbird* to the Warm Springs airport and in a few minutes installed the wings and empennage. Two persons can easily assemble this ship in less than 20 minutes.

The fuselage is of plywood construction and the wings are metal. The 54-foot span gives an aspect ratio of 15.76, well within the sailplane design class.

Full floating elevators are equipped with anti-servo tabs which may be adjusted for trim in flight. The total horizontal tail area is only 10 per cent of the wing area and Harry believes this can be reduced to approximately eight per cent—only about half that of standard horizontal tail areas.

Sitting on the left side I found the seating arrangement nearly identical with the original *Dragonfly*. Since I weigh 195 pounds with my chute and Ted about 185 pounds, we were well over the design gross weight for this little ship. We were always rather cramped in the *Dragonfly* when we wore chutes, and the *Hummingbird* is the same.

Ted handed me a piece of cotton and Harry, who was standing nearby, laughingly said that it was the least expensive, lightest, and best soundproofing they'd been able to devise. Ted then turned on the electric switch for the fuel pump and ignition and primed the engine, which was in its extended position above the fuselage. He heaved on the pull starter handle, located on the right side of the cockpit under the instrument panel, and the four-cylinder, 40-h.p. Nelson engine roared into life. It was so loud we couldn't hear one another—so Ted either pointed, made motions with his fingers or wrote notes to me. Opening the throttle, I watched the airspeed slowly creep up to 28 m.p.h. Ted motioned for me to pull far back on the stick. When I didn't pull it all the way back, he did; and immediately the ship picked up speed as the nose wheel lifted out of the six-inch grass. We were airborne at 38 m.p.h. but remembering the characteristics of the *Dragonfly*, I eased forward on the stick until we reached the best climb speed of 41 m.p.h. We climbed out of the field over the hangar and power lines at about 280 f.p.m. With the little engine grinding away we climbed to 3,000 feet in very still air.

The *Hummingbird's* retractable gear had long since been tucked away with about 20 turns of a small crank handle between the seats. The ship was slightly nose heavy, so I trimmed it by turning a small horizontal wheel between the seats.

With the engine turning 4,400 r.p.m. I gradually pulled the nose up to an indicated airspeed of 36 m.p.h. and felt the ship tremble, nose down, and recover without falling off. I purposely held the stick back to continue the series of power stalls and there was no appreciable difference in any of them. Next, I tried longitudinal and lateral stability tests. Longitudinally, the ship dampens out its oscillation in approximately six beats. Directionally, when the nose is yawed to

15° off center, it dampens out in about two and a half beats. Laterally, the period of recovery is rather long but requires only one beat. From a soaring pilot's standpoint the spiral stability is marginal.

I motioned to Ted that I'd like to try power off performance, so he turned off the fuel pump. The engine soon ran out of fuel and stopped. I took the soundproofing out of my ears and Ted called Harry Perl on the radio. Harry told us that we seemed to be above an area swarming with air-sea rescue craft. Looking below, as Ted retracted the engine, I saw several multi-engined planes, a helicopter, and numerous lightplanes. It was obvious that the balance of our tests would have to be carried out elsewhere, so turning toward the nearby ridge we cruised several minutes in smooth air. Meanwhile I noted the best glide speed was about 60 m.p.h. The sink was 6 f.p.s. at this speed, and it was amazing how much ground we could cover with little loss in altitude.

Stall and stability characteristics, without power, showed no undue variation except that the directional condition was not as good, apparently because of the fixed trim for power-on condition and the lack of propeller blast over the vertical tail surfaces. I asked Ted if I could spin the ship and he reluctantly gave his permission. Pulling the stick back until the stall was reached, I pressed right rudder. The ship nosed down and turned to the right in what I would term a natural lightplane type of spin. The nose was not too far down as in some sailplanes nor was it too high. After one turn, I made a conventional recovery and at no time was there any oscillation or stick "back pressure" during the maneuver.

NELSON "HUMMINGBIRD"
(Tandem Model)
(This sailplane not certificated and available on special order only.)

Engine	H-59 (40 h.p.)
Wing span	54 ft.
Length	24 ft.
Height	7 ft. 8 in.
Empty weight	700 lbs.
Gross weight	1,050 lbs.
Wing area	185 sq. ft.
Aspect ratio	15.76
Rate of climb	300 f.p.m.
Fuel capacity	4 gals.
Top speed (with power at 3,000 ft.)	80 m.p.h.
Low sinking speed (at 45 m.p.h.)	3¼ f.p.s.
Minimum high speed sinking (at 85 m.p.h.)	15 f.p.s.
Maximum dive speed	120 m.p.h.
Price (custom built)	$5,000 to $7,000

Source: Nelson Specialty Corp., San Leandro, California

Spins and their recovery are important to the soaring pilot. Under severe turbulence, cloud flying, or in large areas of lift, it is desirable to reach lower or safer altitudes without undue stress on the glider. Unless the glider is equipped with dive brakes, one of the best ways to lose altitude is via the spin. The *Hummingbird* passed this test very well.

When we reached 2,000 feet we headed back toward the field. Ted radioed Harry, who advised us that air rescue planes were still in the area. We entered the pattern at 500 feet and pulled the spoilers. The sink immediately increased and Ted lowered the wheels. As we skimmed across the field Ted cautioned me to pull the stick back. At any minute I expected to mush in the last three feet but the ship skimmed across the ground. Then it started to settle. With the stick against the rear stop, the *Hummingbird* landed smoothly on its rear wheels and continued through the grass for some time before it slowed down and the nose wheel touched. This technique was rather strange to me after operating off paved runways and dry lakes. Ted explained that we would never have rolled back to our starting point through the tall grass if the nose wheel had been on the ground right after landing.

Harry now climbed in the left seat and I moved to the right. I did not do so well starting the engine, as it requires a stronger tug on the starting handle than the original *Dragonfly*. As soon as we reached about 1,000 feet Harry took over and gave the stick a sharp tug. As it reached its rearward position he released it and it swept rapidly ahead and then from a position just forward of neutral, the stick whipped back of neutral and then back to neutral. In two and a half even quick beats the stick automatically sought its neutral position. I tried the same maneuver and the stick snapped back to neutral. Harry yelled above the engine noise, "I'll tell you about it later." This trick intrigued me. As soon as we had several thousand feet we shut down the engine, and Harry asked, "What do you think of that elevator control stick pressure?" Then he went on to explain that the unbalanced tab or flap on the trailing edge of the elevator always worked against the fore or aft movement of the stick. "We have elevator control with this arrangement at about 60 per cent of stall speed," he said. "That's why we can get the last bit out of the wing when landing in a grassy field. The elevator tab combination is so powerful that we can maintain high angles of attack of the wing at slow speeds, thus permitting shorter take-off runs in grassy or rough fields and longer landing runs without power."

The instrumentation of the *Hummingbird* consisted of "G" meter, sensitive altimeter, vertical speed indicator, air speed, two turn and bank indicators (one operating from three flashlight batteries) electric tachometer, and Lear Transceiver.

As I climbed out of the ship I felt stiff and cramped. I told Ted that the *Hummingbird's* seating is quite uncomfortable. He agreed, but pointed out that the *Hummingbird* is highly experimental and that he was using *Dragonfly* fuselages that were in stock. After he proves the powerplant, retract mechanism, wing and empennage configurations, he intends to build a high performance tandem fuselage that incorporates the best features of the present *Hummingbird*, with the added advantage of pilot comfort.

In retrospect, the *Hummingbird* is the finest powered glider developed to date in America. The present ship more than meets the requirements of a good sailplane. The retractable tricycle gear, while expensive, functions well and the visibility is excellent. END

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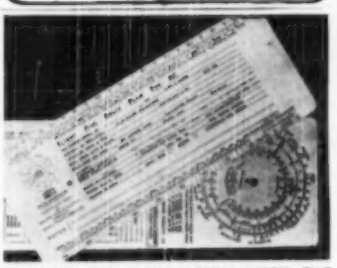

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War and Private Flying

(Continued from page 17)

The card would have to be turned in after each flight, and all controllers along the route would stamp it with required information.

Fuel Restrictions

Plans for rationing aircraft fuel in the event of an emergency—and to what degree—are still undisclosed, but it is certain that there will be a curtailment of fuel use for non-essential flying when the time for restrictions arrives. At what point it will come lies with the President, now that he has been given emergency powers.

Fuel restrictions may, in the final outcome, determine how many civil aircraft, what types and for what purposes, will be permitted to fly, as the war situation moves along. The Government is lending a sympathetic ear to the points made by the aviation organizations as to the importance of non-scheduled aviation to the nation's economic life—agricultural uses, executive airplanes, and actual "work" aircraft in many of the country's vital industries. Within the bounds of availability of fuel, the Government will probably set up a priority list for airplane uses should rationing reach the point where it is necessary to choose between various types of utilitarian flying.

The Government recognizes the many jobs that the some 90,000 U. S. civil aircraft may perform in furtherance of the war effort—if they are not grounded by restrictions, rationing, or for other reasons. Some of these include the movement of wounded, patrol, traffic control, communications, courier work, agricultural uses, and many others.

Airports

The U. S. has almost 5,000 municipal and commercial airfields, plus some 1,500 private and other civil landing areas. Every effort will be made to keep these airports operating, Government officials say. Those able to meet certain security requirements probably will be designated as "control airports."

Control airports will be charged with responsibility of maintaining airport registers, as well as keeping suitable charts, directories and other data to assure proper pilot briefing on the location of restricted areas and other security requirements in connection with proposed flights. They also will be asked to maintain records of aircraft and owners, and to post and comply with such security directives as they may receive from military or civil regulatory agencies.

The Advisory Committee has recommended that the criteria for control airports be set up at once, and that preliminary screening for selection of such airports be accomplished, at the state level when possible. CAA then would be able to designate the fields with the least possible delay if required by the military situation.

Local airports are considered by the Government to be part of the civil defense and disaster relief machinery. "With the military forces completely occupied with the prosecution of a major war," the ADAC recommended, "and with land transportation disrupted or clogged to capacity, a few small airplanes could mean life or death to entire communities, provided a suitable landing field is maintained to receive them."

Aside from disaster relief (an atom bomb is seen as a possibility in the portion of the report from which the above paragraph is taken), maintaining airports as headquarters for local civil defense activities is being considered.

The military apparently does not intend to take over civilian airports in the foreseeable future. Prior to any such expropriation, the armed forces will probably reactivate, as far as practicable, the large number of surplus World War II airports. If civil airports are then still needed for military use, civil and military traffic will probably use the fields jointly until the full capacity of individual fields is needed for military aircraft alone. Civil management of the field would continue during such co-tenancy, with the military paying "user" charges.

Aircraft

In the near future, all civil aircraft will probably have to be registered with a State Defense Council, a "control airport," or both. Such registration will serve a twofold purpose—security control and mobilization planning. Registration forms will be circulated at state and local levels.

Once registered, lists of aircraft available within a given locality would be prepared in the event the planes were desired for defense or other emergency purposes.

At the same time, it is expected that special provisions will be set up to permit local flights of agricultural aircraft and certain specialized industrial aircraft, recognizing that such activities must operate under blanket authorization in which flight plans and two-way radio requirements may have to be waived. This is particularly true in remote areas where no usable communications facilities exist, or along fixed patrol routes.

In the event of total emergency, the rosters of aircraft by type would make immediately available such planes as might be necessary for any emergency, since under this phase of the war, if it should come, all civil aircraft and their pilots would be held in readiness and subject to call to perform any defense job within their capabilities.

However, in any state of mobilization short of total emergency, it is not expected that privately-owned aircraft will be expropriated by the military. Military leaders are aware of the mistakes made in the early days of World War II in requisitioning business airplanes that might have served a more productive purpose in industry.

Schools

Civilian flying schools will be used by the Air Force for basic flight training of some of its pilots. This instruction of military pilots will keep many planes in the air which might otherwise be grounded. Air Force will select sites and will call for bids from interested schools in the area.

In addition to training military pilots, flight schools probably will be permitted to continue training non-military students at least until the "pinch" of total emergency is near. In the latter case, more complete operations records than some schools have kept in the past will be required.

There are no plans, as yet, for a civilian pilot training program as in World War II.

Schools which include radio, navigation, meteorology and other subjects beyond basic aircraft handling may be expected to get some new students in these fields, since the possibility of grounding all planes without two-way radio may

"That isn't exactly what I meant by 'peel off,' Miss Harden . . ."

arise, and since it will be Government policy to encourage training and practice in these aviation fields.

No specific restrictions on schools, other than those which will affect schools as they affect aviation and the use of airplanes generally, are on the boards at the present time.

Government Agencies

If the President invokes his authority to establish rationing for all strategic materials in short supply, the action could affect every phase of aviation. Thus far, however, he has demonstrated no intention to do so. The next most important single piece of legislation in the lawmaking mill is the amendment adding "Security Provisions" to the Civil Aeronautics Act of 1938. This one bill is, in effect, an "enabling act" under which almost any wartime restriction could be slapped on civil flying—even without a declared war.

Senator Ed Johnson of Colorado, its sponsor, says: "We regret that such a bill is necessary, but war makes it necessary; it is a war measure. . . . It is designed to prevent a sneak attack by enemy aircraft masquerading as U. S. civil aircraft.

"At the present time, neither the civil nor the military agencies of the Government have authority to control the flight of U. S. civil aircraft over the United States except in the interest of safety of flight in air commerce. The present law . . . does not recognize national security considerations as one of the bases for the control, identification, and location of aircraft.

"The bill gives the Secretary of Commerce and the Civil Aeronautics Board this power whenever the President, by an Executive Order, declares such powers should be exercised. The President is not limited to periods of war or a declared state of national emergency."

Meanwhile, the CAA has been exploring the possibility of "militarization" in the event of a declared national emergency, and a proposed bill has been drafted to authorize the President to transfer the CAA, or portions of it, at least, to the Air Force under emergency conditions. If such a transfer is made, much of the technical personnel of the CAA would probably put on military uniforms for the duration and revert to a civilian status at the war's end.

One of the major arguments in favor of such militarization is that a large percentage of CAA personnel are veterans and members of reserve components of the armed services who might be called back to active duty, or who might seek transfers back to military duty if such provision were not made.

Feederline and Charter Service

While feeder lines are not strictly a part of the non-carrier segment of aviation, and there has been no statement of policy as to how they will fare in an emergency, the ADAC strongly recommended in its report that "both safety and the public need justify immediate liberalization of Federal policy to permit public transportation in non-air-carrier type aircraft over more routes by more operators."

In this proposed wartime expansion of feeder service, it was recommended that CAB grant certificates to operators for a minimum of five years instead of three, as at present, to stimulate development of new aircraft for defense needs.

Likewise, a committee recommendation urging relaxation of CAB policy with regard to charter, air taxi and jitney service, is being studied. As a result of the recommendation, it is likely that applications for such service will increase, thus giving CAB an opportunity to formulate a new policy for the duration.

The ADAC report expressed the belief that aircraft in the hands of fixed-base operators now offering service to the public in air taxi and charter work "should be more efficiently and effectively utilized in the national interest by being permitted to operate on a 'jitney' basis with scheduled frequency."

Equipment

Government action to encourage (and later, possibly, require) installation of two-way radio and VHF transmitters is expected to have a good effect on the radio equipment field, since it will serve to propel now-available inventories of radio equipment into use. It will also encourage additional production and distribution of this equipment before raw

IN THE accompanying article, frequent mention is made of the Aviation Development Advisory Committee, upon whose recommendations many of the wartime controls over aviation will be based. This committee is made up of 12 representatives of the aviation industry, one from each of the seven continental areas of the United States corresponding to the seven CAA regions, and five at-large, representing manufacturers, consumers, users, state aviation officials and aviation associations. Its purpose is to advise the Administrator of Civil Aeronautics regarding the trends and needs of civil aviation development. Its members include:

George E. Haddaway, editor and publisher, *Southern Flight*, chairman; Maxwell W. Balfour, vice president and director, Spartan School of Aeronautics, Tulsa; Dr. Lynn L. Bollinger, Harvard University Graduate School of Business Administration; Dr. H. L. Casebeer, president, Butte, Mont., Chamber of Commerce; Leighton Collins, editor, *Air Facts*; Arthur Godfrey, private pilot and radio and television star; J. B. Hartranft, Jr., general manager, Aircraft Owners and Pilots Association; W. O. Marsh, president, Marsh Aviation Co., Inc., Phoenix; James D. Ramsey, director, Nebraska State Aeronautics Commission; C. J. Reese, president, Continental Motors, Inc.; E. B. Williamson, president, Bearing Sales & Services, Inc., Seattle, and Harold F. Wood, president, Wood Chevrolet Co., Inc., Birmingham, Ala. Wiley R. Wright, director of CAA's Office of Aviation Development, is executive secretary of the committee.

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material priorities and man-power shortages curtail its manufacture.

Recent establishment by the FCC of the new itinerant flyers' universal communication frequency (UNICOM) of 122.8 megacycles, and encouragement by Government agencies in its use, should spur radio equipment production.

There has been as yet no curtailment in any raw materials or manufactured equipment used in aircraft. Whether there will be depends upon the war.

Manufacturers and Suppliers

Manufacturers of civil-type aircraft are making some 300 planes per month, far ahead of pre-war production. There has been no limitation of production and, aside from the 400 L-19's on order by the military from Cessna, none of these manufacturers are making any types other than non-transport, non-military planes. It is significant, also, that more than 75 per cent (in value) of current production is of four-place or larger airplanes, indicative of the swing to larger planes for business and industrial purposes. In 1946 about 90 per cent of production was accounted for by two-place jobs.

Aluminum, copper, steel, and all the other raw materials for airplanes are obtainable without priorities or rationing (except for a 10 per cent cut in civilian use of rubber), but a continuance of the war will assuredly bring controls. In anticipation of these controls, the CAA will, if it follows ADAC's recommendations:

(1) Seek assurances from other Government agencies that the small-plane manufacturing industry will be assigned production schedules for both aircraft and parts as high as possible consistent with needs of military aircraft manufacture; (2) make a survey to determine what civilian-plane parts are likely to be in short supply in the event of all-out mobilization, and (3) acting on the basis of the survey, take action to have the short-supply parts manufactured and stockpiled.

It was pointed out that, should civil aircraft be used in an emergency, adequate spare parts would be vital.

Civil Air Patrol

Many private aircraft operators are members of the Civil Air Patrol, a quasi-military organization. In an emergency, it is likely that these pilots with their aircraft may become, on a part-time basis at least, part of the military. It is contemplated that the CAP will perform duties similar to those performed in World War II—courier service, patrol work, and similar flying activity—except that this time it will probably be on a far greater scale, and probably under a more military organization. Since the war, CAP has officially been made an auxiliary of the USAF, a much closer connection than existed previously. END

How to Finance

(*Continued from page 25*)

specialist should be able to pick up the sheet on any airplane and evaluate it exactly. All information on the engine should be exact tallies of log book entries. Someone will certainly check the sheet against the log books.

Sixth, application for insurance. The insurance problem has not been solved to date. Most insurance companies have stopped issuing aviation hull policies. In a few cases the finance companies include enough extras to build up a reserve against losses.

Just before Pearl Harbor, two young pilots from Louisville, Ky., borrowed $350 from us on a $500 J-3 *Cub*. We figured these boys were good risks, and decided to carry the insurance ourselves.

One month later one of the brothers, while waving at his girl friend on final approach, wafted the *Cub* into a grove of trees. Final salvage brought $130, less trucking charges.

Our net loss in this case was $250 through lack of insurance. The mortgagors were fairly judgment-proof and not worth the expense and waiting of litigation.

Seventh, the chattel mortgage or conditional sale contract. This is the joker, and it includes paragraphs of that "fine print." The chattel mortgage is a paper in which you retain ownership but forfeit it automatically if you do not pay up. The conditional sales contract is a contract in which the finance company retains title until final payment is made. In either case, when you sign your name you must either stack the airplane or pay up each month. The "fine print" is the result of generations of loan procedure. Read it before, not afterwards, and you'll not be sorry.

Now let's turn to the costs of financing the Cessna 120. We want to pay down $500 and finance the balance of $500. At any reputable bank you will have to pay from five to six per cent interest on the borrowed money. So you pay $30 for the privilege of using the $500. Add this to a $15 territory charge. This is a standard charge, and covers a small cut-back to the person who swings the deal, covers mailing costs, notary fees, recordation fees and, sometimes, inspection costs.

Some companies require a title search in the CAA files in Washington. Let's say that this costs another $15. Other companies require you to send them a clear title through the mails.

How about the great current headache of aviation economics—aviation insurance? Some companies require you to produce insurance, some require that they furnish the insurance (and will finance it also), and some will charge you an additional per centum and absorb their own losses. In this case, we are going to write National Insurance Underwriters, 34 N. Brentwood Blvd., St. Louis 5, Mo. According to our latest figures, public liability and property damage will cost 12 cents per day, or $44 per year for non-commercial use. If the finance company carries the title in its name it will need this minimum protection. The AOPA has a grand deal in insurance for all private pilots, and it seems to be as reasonable as any hull policy we have seen.

In any event, we shall assume that the finance company's insurance bill will run around $100 which will protect it on public liability and property damage, and sometimes, single-interest hull insurance.

Let's recap the situation at this point:

$1000.00	Sale price for Cessna 120
—500.00	Down payment
500.00	To be financed
30.00	Interest at 6 per cent.
100.00	Insurance.
$ 630.00	Balance to pay back.

Divide this by 12 to get your monthly payments: $52.50. At the start you also will pay the $15 territory charge and $15 search for title. But practices in this respect differ also, and some companies put these items on a monthly basis.

To digress for a moment, let's investigate some of the problems of aircraft financing.

It has become quite evident to bankers that financing airplanes is not like financing automobiles—it is more like financing oil well stocks. Word has spread over the nation that airplane paper is too hot to handle. So, in the past 12 months, it has become hard indeed to find a company willing to take your signature.

Why are bankers and financing houses afraid of aircraft?

The reasons are two:

- The bursting of the lightplane price bubble left bankers with junk, or unlicensed aircraft, worth only a small percentage of their loan. Some outfits held as high as 50 airplanes, many of them Army surplus and good only for bonfires. This situation broke a number of small companies and left larger ones disgruntled.

I bought 12 North American AT-6's, sold 11 of them at a profit, even with financing, then the 12th lost our previous profits and a little besides. We ran a "flyer" in five PT-23's, lost money and have two of them with us today.

- The instability of the youthful, vinegar-and-pepper purchaser of planes. A small percentage of adventurous, buzzing pilots financed airplanes, buzzed, stacked them, and walked away bragging. "Aw—let the finance company worry—."

Try to find a decent aviation hull insurance policy. The rates are either prohibitive or non-existent. Why? Carelessness and the buzz artist have scared aviation insurance almost out of the picture. If no insurance is forthcoming from the statistical experts, then where does the finance company come in?

It gambles on your character, and wins or loses, depending on your stability. For the above reasons, and a few minor ones, aviation financing is at a low ebb.

Market value on used airplanes is a problem that can injure you and the finance company. Since there is no stock exchange for used airplanes, what is the market value of a Cessna 120, for instance? We know that an average 120 should sell for around $1,000. Financing

$500 of this amount would be good business would it not?

Out in Kansas City, Joe Doakes has found his dream Cessna 120, price just $1,950. He doesn't know market value but he does want the airplane. He wants the finance company to loan him $1,000 of the sale price. Suppose he secures the loan.

One month later Joe decides to sell on the market. He might get $1,000. He still owes the finance company $1,000. Is Joe happy?

If Joe has the money he will have to pay off, and be a sadder, bitter pilot; if he is insolvent, the finance company spends $100 repossessing the aircraft, and by the time the red-tape is untangled, will sell the Cessna for maybe $750.

Several companies that finance airplanes have solved this problem. They sell and finance only their own aircraft. Each has been checked for airworthiness and trouble-free operation for a year, and secondly has been placed on the market at current market value.

Joe Doakes now buys his Cessna 120 at $1,000 and relies on two things: (1) the airplane is entirely airworthy, and (2) his invested value is normal and likely to stay that way. The finance company knows its investment thoroughly and in nine chances out of 10 will make a decent rate of interest from the transaction.

As aviation comes of age, market values and depreciation should stabilize, much as has happened in the automobile industry.

Let's revert to the set of conditions mentioned at first.

(1) Solid thinking. You've done this before purchase and you will have to take the fruit of your thinking, good or bad.

(2) Economic cycles. The market value on airplanes is low at present. It is doubted if it will ever get much lower. The dissipation of Army surplus and the law of supply and demand are forces which are making for a much better market. Therefore, by buying an airplane in good shape this year, your investment should increase by next year, or at least remain the same. It is a real buyer's market.

(3) Good character. If you're the type that wants to do the right thing, take care of the airplane and yourself.

Good trainers and coupes are available at $500 and up. Financing half of this, as the boys did in Findlay, Ill., would leave a $250 balance, plus interest, insurance, etc. Payments of $30 per month for a year should take care of all extras and give you title in one year.

By buying a good $500 airplane and paying it off, your depreciation charges will be very little. Also you will have added one airplane to your assets. If you figure everything carefully, your flying should cost little more than horseback riding. And boy, when you're through, you'll own the horse! END

Wings That Stretch

(*Continued from page 27*)

ly successful at that time, for the wing loading of 61 pounds per square foot (in flight, with extra surface retracted) was rather heavy for the plane's 580-h.p. supercharged Lorraine 12-cylinder water-cooled engine. Nevertheless, the plane flew well, and within a short time the Lorraine was replaced by a 950-h.p. Gnome-Rhone K-14 radial which provided the necessary extra power.

The first prototype, a two-seater, weighed more than 11,000 pounds loaded. It had a cruising speed of 180 m.p.h. and was designed solely to test effect of surface variations at different altitudes. It did not have such luxuries as a variable-pitch propeller or retractable undercarriage. Makhonine's tests proved so successful that the French government subsidized his experiments with a grant of 1,000,000 francs.

During the 1930's the experiments continued steadily and were in progress when the Germans took France. The Nazis were fascinated by the Makhonine theories and even allowed him to continue his tests for a year under their supervision.

In 1941, however, the Germans decided they'd like to take the plane to Berlin for more study. Makhonine could have remained in Nazi favor by acceding to the demand, but instead he asked permission to make just one more test flight with his test pilot before the plane left France. The Nazis granted the request and the test pilot (M. Burtin) deliberately crashed the plane. It was damaged sufficiently to prevent removal to Germany.

The original drawings of the craft had been filed at the French Air Ministry and destroyed before the Nazis could remove them. But detailed drawings of the damaged plane were made by Nazi technicians and the plans were sent to Berlin for further study.

Makhonine told me that the Germans were planning to build 1,000 planes with telescopic-wing principles. The damaged craft was housed in a hangar at Villacoublay where it was later totally destroyed in an American raid on the airfield.

After the liberation, Makhonine started work on a second aircraft, the Mak-123, at his factory at St. Maur, near Paris. This plane flew successfully for the first time in 1947 from Toussus-le-Noble airfield. It performed so beautifully that on the second flight Makhonine climbed to 13,000 feet, put the nose down, cut the engine, extended the outer wing sections —and succeeded in gliding for over an hour!

Unfortunately, on a later flight an engine failure necessitated a forced landing in a potato field, severely damaging the craft. By the time this article reaches FLYING's readers, however, the Mak-123 should be flying again.

Considerably larger than the first machine, the Mak-123 is a four-seater powered by a German BMW 801 radial engine developing 1,800 h.p. It has not yet

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been flown at a loaded weight above 13,227 pounds but Makhonine anticipates raising this to 22,046 pounds—and a maximum speed of 528 m.p.h. is anticipated at altitude with wing retracted. Owing to the considerable wingspan when the outer sections are extended, the Mak-123 can take off with flaps at a considerably greater angle than an orthodox airplane and with a consequent improvement in take-off performance. When the wings are retracted in air there is no noticeable sinking tendency. The only effect is a sudden increase in revs, the airplane surging forward under the lessened drag. When the wings are opened the plane automatically climbs owing to the increase in lift.

The Mak-123 is a low-wing cantilever monoplane. The wing consists of three portions: The middle part is built into the fuselage and is structurally in two parts for both the upper and lower surfaces are built strong enough to take their own bending loads. These surfaces are joined by two girders, one running along the leading edge and the other forming a false spar upon which to mount the aileron. Inside the tube thus formed is a box spar of metal and a fuel tank with a capacity of 158.5 gallons. The two outer sections of the wing are of conventional wooden construction and slide within the middle portion. Rollers are placed at the extremity of these sliding parts to transmit the loads to the metal box girder over which they slide, and other rollers are placed at the extremities of the middle portion to take the loads and to ease the passage of the sliding sections. The outer sections can be extended or retracted by a quarter h.p. motor installed in the fuselage. In case of emergency the wings can be operated manually or by compressed air bottles.

The Mak-123 has the following special characteristics: The lifting surfaces and wingloading with the outer panels extended is 387.5 square feet and 56.3 pounds per square foot respectively, and with the outer panels retracted 215 square feet and 102.4 pounds per square foot. Makhonine believes that the basic principles of the telescopic wing may have wide application for future high speed flying, but until the present machine is repaired and flight trials completed he will not give any details of the third and larger machine that is now on the drawing board. END

The Mail Box

(Continued from page 7)

Information Manual, which is revised every six months.

Mr. Merrell does not mention *Facts of Flight*, *Path of Flight*, and *Realm of Flight*, all of which are well written, up-to-date and inexpensive.

He says that the student doesn't know what to study for an exam. Of course the student won't know what to study if the instructor fails to show him the *Commercial Pilot's Examination Kit*, which outlines the material covered by each exam, gives a good list of texts to be studied, and even gives sample questions on each subject.

Mr. Merrell claims that the examinations are tough. A Washington, D. C., ground school publishes the following guarantee: "If you attend all classes and fail your CAA exam, the cost of the course (less $5 for registration) will be refunded." With . . . unfair exams, no school could make such a guarantee.

And, finally, Mr. Merrell suggests that the CAA publish 150 questions on each subject, with the assurance that the actual examination would consist of 30 questions from the list. This would be the best way yet suggested to close every ground school in the country. As soon as the questions were published, a few enterprising individuals would publish the answers. All the students would have to do would be to memorize the questions and answers. . . .

DONALD M. THOMPSON
Ground Instructor No. 305489
Fairfax County, Va.

FATAL ALTIMETER

Apropos your article, "The Fatal Altimeter" [September FLYING], the follow- item appeared in a recent *New York Times*, datelined Washington, June 28:

"The Civil Aeronautics Board said today a California Arrow Airlines, Inc., plane crashed into a hill last Dec. 7 near Vallejo, Calif., because the pilot was flying more than 3,000 feet lower than he was supposed to fly.

"The plane, a DC-3, struck a hill 782 feet above sea level and about 200 feet below the crest. The plane had left Burbank, Calif., for Oakland with an airways clearance to fly at 4,000 feet on instruments because of clouds.

"Less than ten minutes before the crash, the pilot, James Stanley Garnett, reported by radio that he was over Richmond, Calif., at 4,000 feet.

"Noting the difference in that altitude and the altitude at the time of the crash, the CAB said the altimeter would not have erred by 3,000 feet."

E. CLEMENT WAKINS
New York, N. Y.

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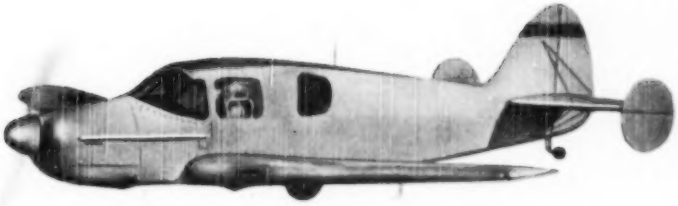

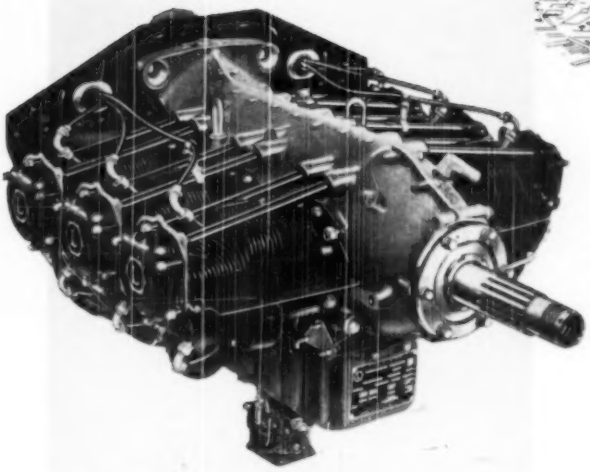

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